ERT

VIPER USER GUIDE

Contents

Appendix

For additional guidance on the ERT AirNow, NOAA and USGS MeterApps, please go to http://www.epaosc.org/site/doc_list.aspx?site_id=5033 to download the Guide(s).

Definition of Terms

VIPER = Instruments + Telemetry + Translation

LINC: Hardware that provides the *telemetry* from the Instrument to a Gateway. Each LINC connects to a single instrument via a cable. Each LINC communicates with a Gateway via Wi-fi. Each LINC includes embedded GPS and appends coordinates to sensor readings

GATEWAY: Hardware that provides the *telemetry* from a LINC to the MeterApps and Survey Controller software. Multiple LINCs can be connected to one Gateway via Wi-fi. The Gateway can communicate with Survey Controller via Wi-Fi, or via the internet by using one of the two USB cellular air card slots or by connecting it to a LAN via its Ethernet port. The Gateways are also capable of forming a mesh network.

METERAPP: Software that provides the initial *translation* of instrument readings sent from the LINCs. A MeterAPP is instrument-specific software that connects to the LINC through the Gateway; receives the native sensor readings and converts it into a CAP message.

SURVEY CONTROLLER: Survey Controller is the primary software component in the Viper system. Survey Controller captures sensor readings and GPS information from the MeterApps. Survey Controller creates and saves deployment "runs". Deployment "runs" contain the list of Instruments, LINCs and Gateways deployed. Deployment "runs" define the communication mode from the Gateway to Survey Controller (Wi-Fi or Cellular). Deployment "runs" define the recording mode of GPS coordinates (Fixed or Mobile). Deployment "runs" define the capture mode of instrument readings (All Readings or Specific Intervals - i.e. 30 seconds, 1 minute, etc).

In near real-time, when internet access is available, Survey Controller sends all recorded run information to Deployment Manager.

Deployment Manager: Deployment Manager allows for viewing instrument readings on the internet as well as leveraging those readings to create Time Weighted Averages and Alarms. Deployment Manager can send E-Mail Notifications when Alarms are triggered. Deployment Manager provides simple graphing of readings as well as the ability to download graphed readings and create Google Earth KML files. Other services (such as Viewers) can connect directly with Deployment Manager data. Automated data exports can be created in intervals that support operational needs.

Section One: Overview

VIPER is a wireless network based communications system designed to enable real-time transmission of data from field sensors to a local computer, remote computer, or enterprise server and provide data management, analysis and visualization.

USEPA-ERT has developed this wireless sensor communication system utilizing Safe Environment Engineering's LifeLine Wireless Monitoring (http://www.safeenv.com/wireless-network-telemetry/) system (http://www.safeenv.com/wireless-network-telemetry/) as a core technology leveraged and enhanced by ERT custom software drawing on the SCRIBE.Net enterprise data model to provide capture, aggregation, persistence, communication, and visualization of sensor data in a manner applicable to a wide range of environmental monitoring equipment and field monitoring scenarios.

The VIPER system supports mobile and fixed monitoring modes with independent or clustered sensor arrays and local and/or enterprise communication strategies. Custom software (VIPER Survey Controller) assists the user in composing and controlling a field survey with great flexibility. The VIPER Survey Controller manages the LifeLine hardware and software, launching instances of the LifeLine sensor controller applications with appropriate configuration files based on the user-defined survey components, communications strategy and survey mode.

In addition, the VIPER Survey Controller manipulates the Common Alerting Protocol (CAP) XML data streams, locally persists the data in SQL Server Express, produces KML dataforms viewable in Google Earth, and publishes data to the VIPER.Net enterprise servers for access via the internet. Enterprise services include a subscription service for maintaining a SQL Server database and a service that provides for monitoring system status and reports.

For additional information, please visit www.response.epa.org/viper, or call ERT Software Support at 1-800-999-6990.

System Requirements: Minimum

- Dual core 1.67 GHZ 32-bit CPU
- 2 GB RAM
- 30 GB Available Hard Disk Space
- Windows XP (with Service pack 3) or higher
- WLAN Adapter – 802.11b
- LAN Adapter – RJ45/100BaseT

System Requirements: Recommended

- Quad Core 2.0+GHZ 64-bit CPU
- 4 GB RAM
- 200+ GB Available Hard Disk Space
- Windows 7 X64 Professional
- WLAN Adapter – 802.11n
- LAN Adapter – RJ45/1000BaseT
- 3G-capable AirCard

Section One: Software Installation

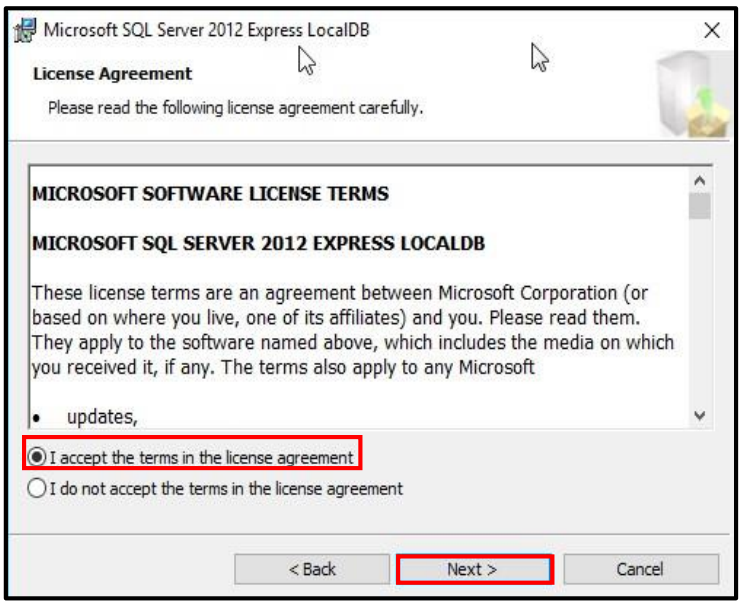
Section One Objectives: Install SQL Server 2012 Express, Viper Survey Controller, and MeterApps

Section One – Part A: SQL Server 2012 Express

The Viper Survey Controller requires a local default instance of SQL Server 2012 Express. SQL Server 2012 Express LocalDB installer meets this requirement, and is freely available for download and installation at https://www.microsoft.com/en-us/download/details.aspx?id=29062

Download the ENU/x64\Sql\LocalDB.msi

1. Double-click and Run the LocalDB.msi.



2. Accept the Terms in the License Agreement. Click Next and Install.

3. Click Finish.

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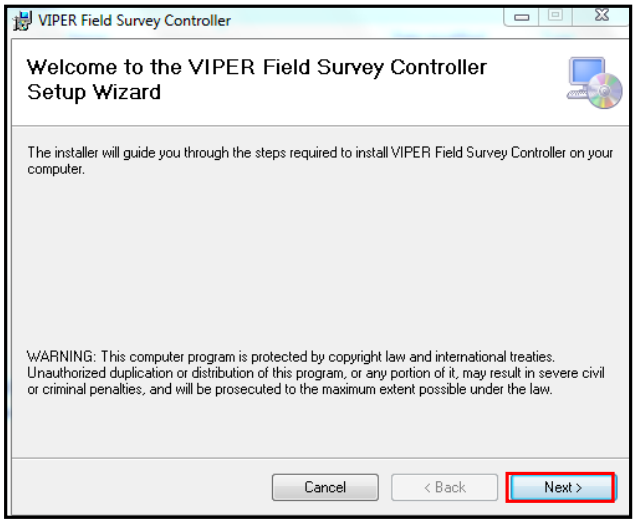
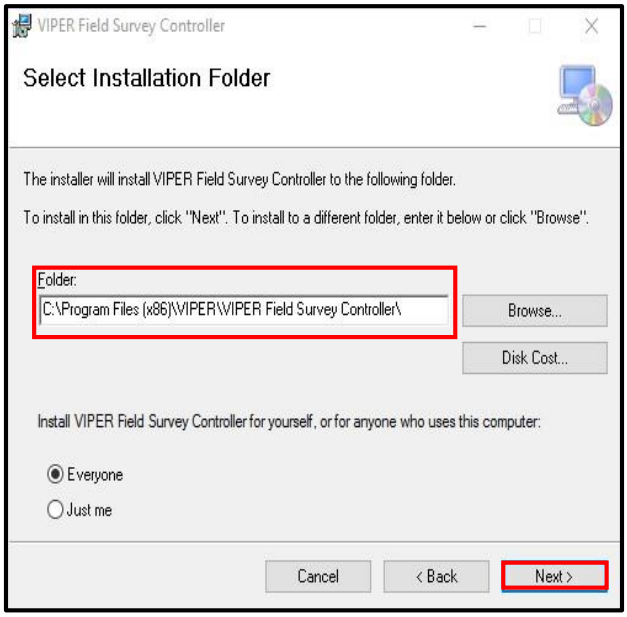
Section One – Part B: Installing VIPER Survey Controller

VIPER Survey Controller is a program that processes CAP messages, stores them in a local database, and publishes that data to an enterprise system every minute (*VIPER.Net).* The VIPER Survey Controller is available for download at www.response.epa.org/viper under the Documents Section. Download and save the file. You will need to login to the response.epa.gov website to download the file and you may need additional rights. Contact ertsupport@epa.gov or 800-999-6990 if you have any issues downloading Survey Controller. Once saved, to install the VIPER Survey Controller, double-click on the Field Survey Controller Setup.

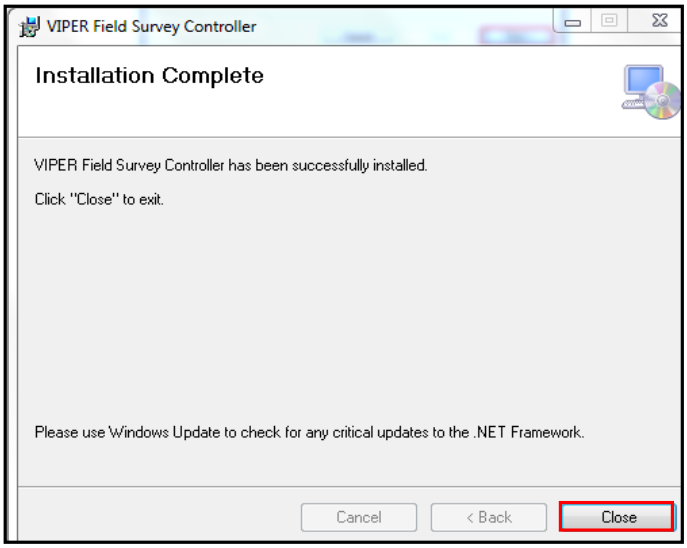
1. Click on Next at the Setup Wizard.



2. Accept the default install directory (or Browse and change as necessary). Click Next.



3. Once the Installation is Complete, click the **Close** button.



4. Run Survey Controller and complete the registration information. This information will allow ERT Support to contact you if any issues or concerns exist with your Viper Deployments.

   It is suggested that the VIPER Instance Name contain the Region number and the Site/Response/Exercise name and provide specific Viper contact details for the current deployment. See Section Three: Part A for additional details.

Section One -- Part C: Lifeline MeterAPPs Installation

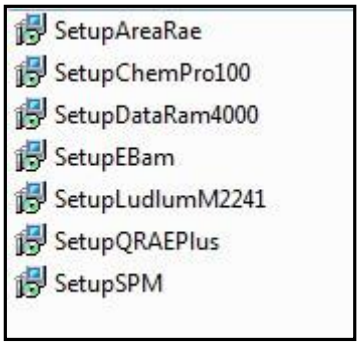
A MeterApp is the program that receives the string (instrument readings and GPS information) transmitted from the LINC and turns it into a CAP (Common Alerting Protocol) message for use by the Viper Survey Controller.

The instrument-specific (ie., AreaRAE, DataRAM, E-BAM, Ludlum, SPM, etc.) MeterApp application(s) are available for download by visiting www.response.epa.org/viper. You must be logged in to the Viper Website and have View Private Privileges to see the full list of MeterApps in the documents section of the website. Please call ertsupport at 800-999-6990 if you need to be added to the Viper Website.

To install the instrument MeterAPPs:

1. Download & save the MeterAPPS for the equipment you own. See paragraph above for download instructions.

2. When files have been downloaded, most of the files will need to be renamed. Browse to the folder where the files were saved and RE-NAME the files containing both an .MSI and .ZIP extension to have just an .MSI file extension. (When downloaded, most of the files will have both .ZIP and .MSI in the file name. .ZIP needs to be removed. If you do not see the .ZIP, make sure you change your folder options to show file extensions for known file types.)



3. Select an instrument-specific MeterApp file and double-click to start the install.

4. Accept all of the defaults.

5. Repeat steps above until all required MeterApps are installed.

You are now ready to build your inventory list in Viper Survey Controller.

Section Two: Inventory

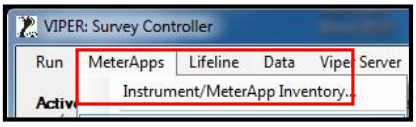
Section Two: Inventory consists of the software inventory (MeterApps) and hardware inventory (Gateways and LINCs)

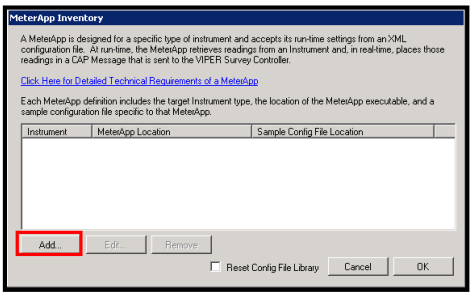
Section Two - Part A: Adding MeterApps to the Survey Controller MeterApp Inventory

Now that the MeterApps have been installed, Survey Controller needs to be aware of those installed MeterApps. This is done by adding the installed Meter Apps to the MeterApps Inventory in Survey Controller. This is done once for each MeterApp installed. Each instrument *type* also needs to be linked to the correct MeterApp and MeterApp config file. After installing MeterApps (Section One -- Part C), a sample (default) config file (xml) will exist for each MeterApp with default settings for the instrument type.

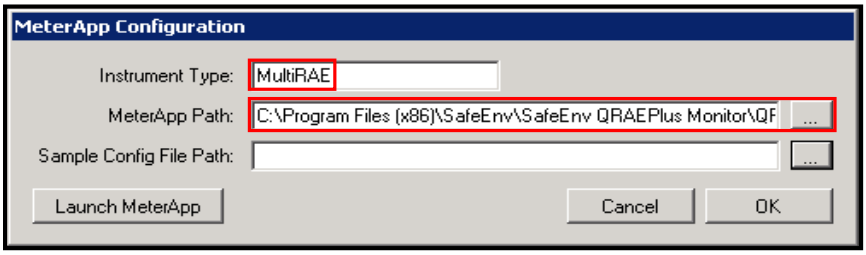
1. Open VIPER Field Survey Controller

2. From the Menu, select Meter Apps > Instrument/MeterApp Inventory and click the **Add** button





3. On the MeterApp Configuration screen, enter an Instrument Type.

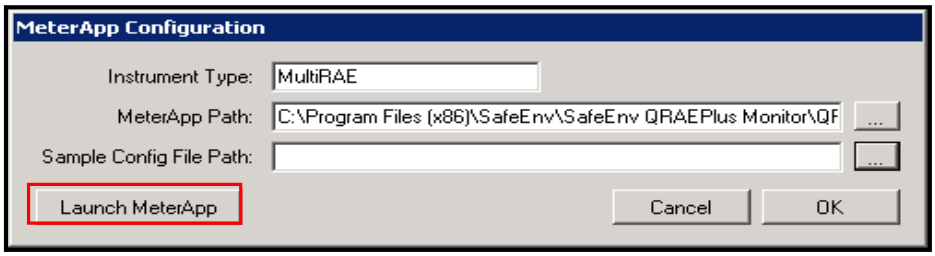


4. Click on the browse button(…) next to the MeterApp Path and browse to the executable for the specific instrument type MeterApp. In most instances, the default directory will be C:\SafeEnv\DNet40

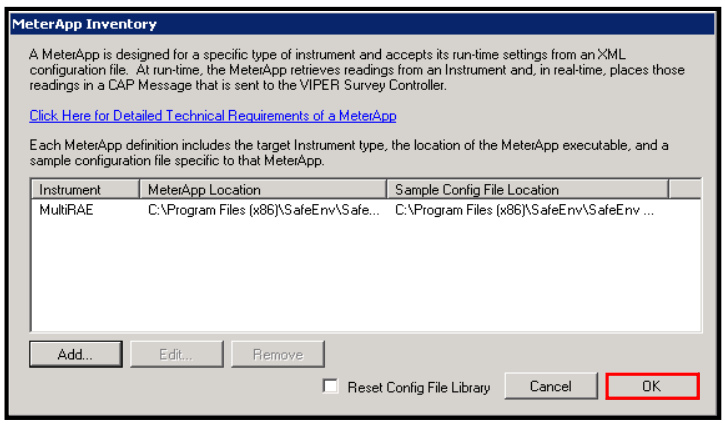
Instrument Type	Folder Name	Executable File Name
MultiRAE	C:\SafeEnv\DNet40\RAESystemsQMultiOrPPB	QRAEPlus.exe
AreaRAE	C:\SafeEnv\DNet40\RAESystemsAreaRAE	AreaRae.exe
DustTrak	C:\SafeEnv\DNet40\TSIDustTrakDMX8553	TSIDMX8533Monitor.exe
DataRam	C:\SafeEnv\DNet40\ThermoDataRam4000	DataRam4000Monitor.exe
Ebam	C:\SafeEnv\DNet\MetOneEBAM	MetOneEBamMonitor.exe
Ludlum	C:\SafeEnv\DNet40\Ludlum2241	M2241Monitor.exe
ChemRAE	C:\Program Files (x86)\SafeEnv\SafeEnvChemPro100	ChemPro100 Monitor.exe
SPMFlex	C:\SafeEnv\DNet40\HoneywellSPMFLEX	SPMMonitor.exe
SPM Monitor	C:\SafeEnv\DNet40\HoneywellSPM	SPMMonitor.exe
SAM 940	C:\SafeEnv\Dnet\BNSAM940	BNSAM940Monitor.exe
AP4C	C:\SafeEnv\DNet40\ProenginAP4C	ProenginAP4CMonitor.exe
MSA SafeSite	C:\SafeEnv\DNet40\MSASafeSite\	SafeSiteMonitor.exe
NOAA Weather Service	C:\Program Files (x86)\ERT Software Support (GDIT)\NOAA Met Station MeterApp\	NOAA Met Station MeterApp.exe
WeatherPak	C:\SafeEnv\DNet40\MTRWeatherPac	MTRWPMonitor.exe
AP2C	C:\SafeEnv\DNet40\ProenginAP2C	ProenginAP2CeMonitor.exe
RadAssist700	C:\SafeEnv\DNet\RadiationSolutionsRadAssist7000	RS7000Monitor.exe

To locate the XML configuration file for that MeterApp, click on the browse button  next to the **Sample Config File Path**. The default directory will be the same as the MeterApp Path. In most instances, the sample config file will be in the same directory as the MeterApp executable and named **SafeEnvMonitor.xml**.

If you cannot locate the xml file, you may need to run the MeterApp for the first time to generate the Sample config file. If this is the case, exit the browse dialog and click the Launch MeterApp button. Now click on the browse button and you should see the sample config xml file.



5. Click OK and the instrument *type* will appear in the inventory list.
6. Continue to add the remaining Instrument *types* and link them to the appropriate MeterApp and MeterApp config file.



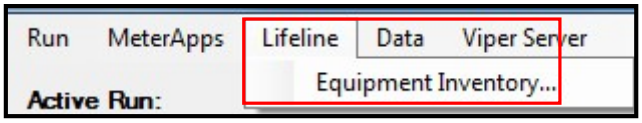
7. Click **OK** at the MeterApp Inventory window when all instruments types have been added to the inventory list.

NOTE: If you check the Reset Config File Library before you click OK, you will reset all of the config files to the initial state erasing any customizations you may have made to the MeterApp.

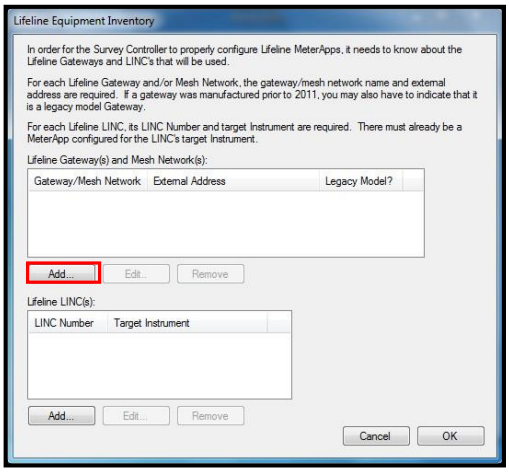
Section Two - Part B: Adding Gateways to the Inventory

A Gateway (Telemetry) is the device that connects wirelessly (wi-fi) to one or more LINCs (telemetry) and enables data transfer from the LINC to the MeterApp (Translation). A Gateway always connects to a LINC via wi-fi, but a Gateway also contains cellular air cards so data can be transmitted to MeterApps via the internet. The Gateway communication mode (how it will find the Meter Apps and Survey Controller) is set at the time a Run is configured (discussed later in Section Three Part B).

1. Open VIPER Survey Controller. From the menu, select **Lifeline>Equipment Inventory**



2. Under the Lifeline Gateway(s) and Mesh Network(s) dialog box, click **Add**.

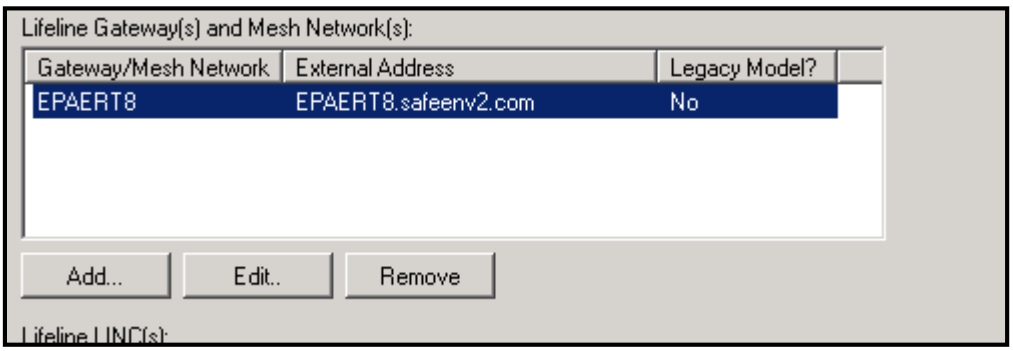


a. Enter the Gateway name. The Gateway name will be affixed to the outside of the Gateway case.

b. Enter the External address of the Gateway. ***NOTE: The external address is always the Gateway Name followed by .safeenv2.com.***

c. Click **OK**.

3. Click OK and the gateway will appear in the list

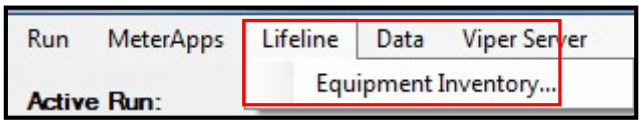


4. Continue adding Gateways.

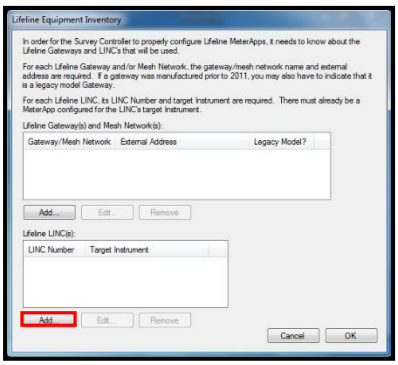
Section Two - Part C: Adding LINCs to the Inventory

The LINC is a device that is attached via a cable to the monitoring equipment. It communicates via **wi-fi** to the Gateway and transmits the data from the monitoring equipment to the MeterApps running on the VIPER Field Survey Controller laptop. LINCs are not added independently – when added to the inventory, they are paired with the Instrument *Type* to which they will connect.

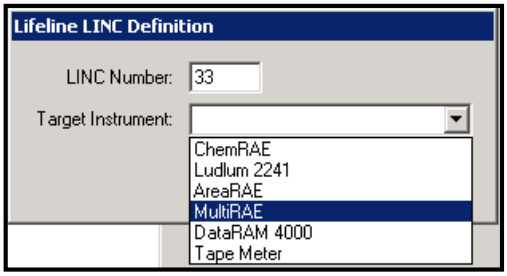
1. Open VIPER Survey Controller. From the menu, select **Lifeline>Equipment Inventory**



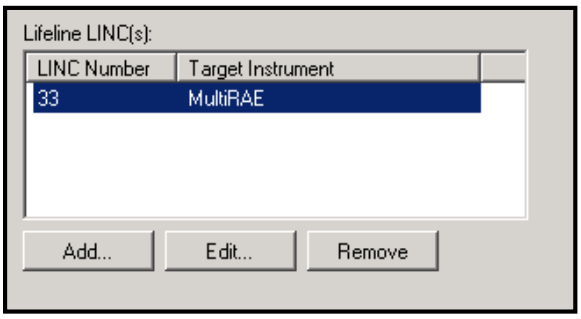
2. At the bottom of the Lifeline Equipment Inventory dialog box, Click the **Add** button immediately under the **Lifeline LINC(s)** section.



3. **Enter the LINC ID number**. The LINC ID number will be affixed to the outside of the LINC Case. In the **Target Instrument drop-down**, select the type of equipment the link will be attached to. (**NOTE**: This list will be pre-populated with the MeterApp Inventory previously entered in Section Two Part A)



4. Click **OK** and the LINC and its associated equipment/instrument type will appear in the list.



5. Add the rest of the LINCs to your inventory and click **OK** to save the inventory and close the Gateway/LINC Inventory window.

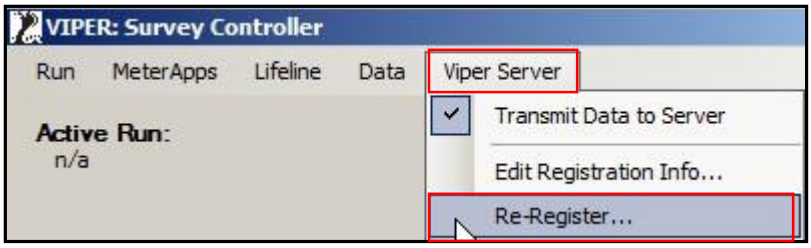
NOTE: The equipment inventory is saved in a database on the Survey Controller laptop. If more than one Survey Controller Laptop will share the same equipment, the inventory database can be configured once and copied to the other laptops. By default, the path and filename are C:\Program Files\Viper\Viper Field Survey Controller\VIPER Equipment.MDB

Section Three – Creating and Configuring Runs

Section Three - Part A: Re-Registering Survey Controller

Each time Survey Controller is used at a **NEW** deployment, it **MUST** be re-registered to correctly reflect the new deployment details. In addition to correctly identifying the new deployment name and specifying the on-site personnel who will be operating Survey Controller, re-registering also assigns a behind-the-scenes unique identifier code for that deployment. This needs to be done once at the start of a new deployment

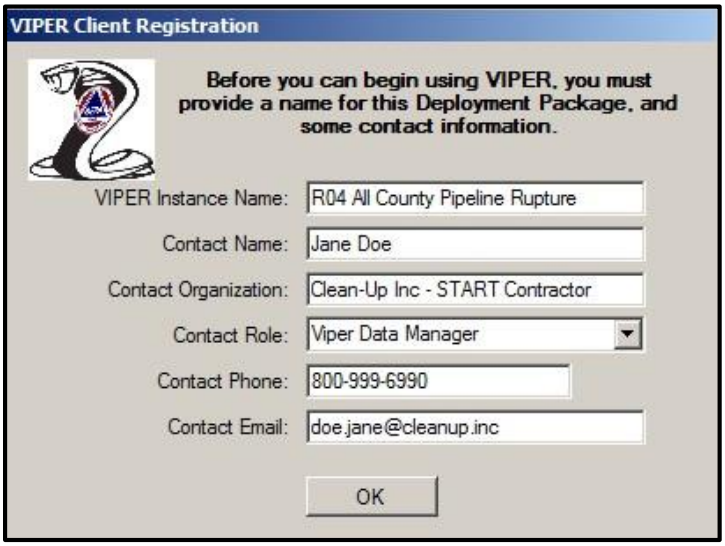
1. Open VIPER Field Survey Controller
2. From the **Viper Server** menu, select **Re-Register**



NOTE – at the beginning of a NEW deployment, use the Re-Register option. If contact information changes DURING an existing deployment, use the Edit Registration Info option.

3. Click **YES** when prompted to confirm that you want to re-register Survey Controller

4. Complete the **Client Registration** and click **OK**
   a. Include the Region number and Site/Response/Exercise Name in the Viper Instance Name field
   b. Provide specific Viper contact details for the current deployment.



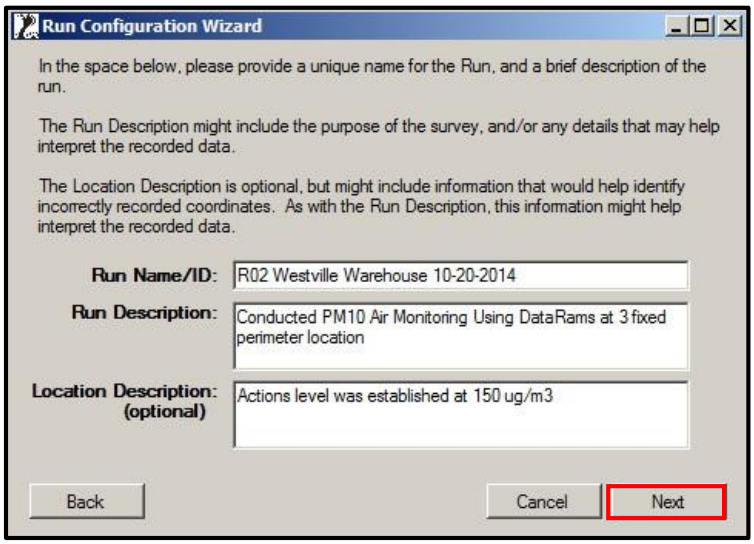
Section Three - Part B: Creating a Run in Survey Controller from Scratch

In Survey Controller the user establishes data collection sessions called "**Runs**". Initiating a Run tells Survey Controller which instruments will be deployed, pairs LINCs with Gateways and configures how the Gateway communicates with the Survey Controller software (wi-fi or cellular). A **Run** must be created every time the instrument configuration changes. Runs can also be started, paused or stopped to match the data reporting period for the site. Saving a **Run** as a template is recommended when runs will be regularly stopped and started. As long as deployed equipment remains the same, saved Templates can be applied when starting new runs – rather than starting runs from scratch each time (See Section Three – Part C). Below we describe the process of starting runs from scratch.

1. Open VIPER Field Survey Controller
2. From the menu, select **Run**>**New Run**>**From Scratch**

3. Click **Next** on the Viper Run Configuration Wizard.

4. Complete the Run Description information.
   a. Run Name/ID - Include the **Region** and **name** of the site/response/ exercise
   b. The run description is required and could include the instruments involved in the run, as well as the scope of work.
   c. The Location Description is optional, but helpful for further identification of the run.
   d. Click **Next**



Below is an example of a *poorly* named run.

Name	Start Time	Stop Time	Description	Location Description
New RunConfig 13	3/7/2013 8:43:46 AM	3/7/2013 5:18:20 PM	ForestCity_3_7_13	Forest City IL

Below are examples of *well named* runs.

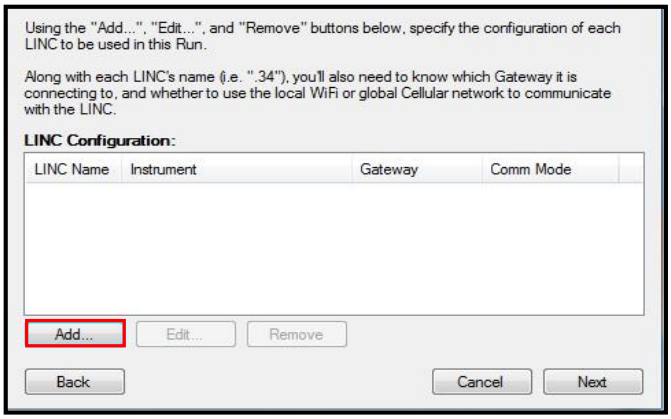
Name	Start Time	Stop Time	Description	Location Description
R05 West School -	10/20/2014	10/20/2014	Conducted PM10 air monitoring using	

Name	Start Time	Stop Time	Description	Location Description
R2_LibertyAsbestos_141006	10/6/2014 9:02:20 AM	10/17/2014 2:31:03 PM	Particulate Monitoring	Lockport, NY

Section Three - Part C: Select which Gateways/LINCS will be deployed in a Run

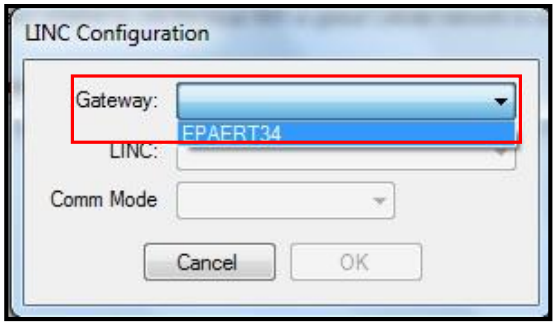
After successfully naming a Run, Survey Controller needs to know which LINCs, and Gateways (inventory) will be deployed. *LINCS and Gateways are added in pairs. Gateways can support multiple LINCs, but each LINC can only be associated with one Gateway.*

1. Click **Add** on the LINC Configuration screen.

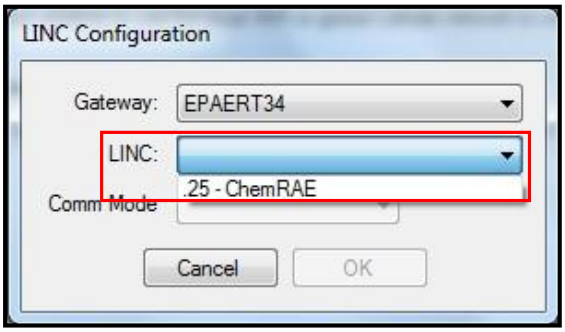


2. From the Gateway dropdown menu, **select the Gateway** to which the LINC will be connected. If the gateway does not appear in the list, it must be added to the Lifeline Equipment Inventory section of Survey Controller (See Section Two – Part B)

   Note: LINCs must always be within WiFi range of their Gateway. (Approx 800 ft range)

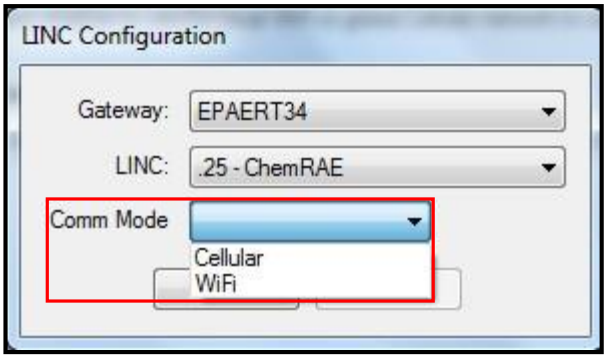


3. **Select a LINC** to be paired with the Gateway. If the LINC does not appear in the list, it must be added to the Lifeline Equipment Inventory section of Survey Controller (See Section Two -- Part C). LINC numbers are typically found on the side of the LINC case.



4. Select the Comm Mode. The Comm Mode determines how the data will be sent *from the Gateway to the Survey Controller software*.

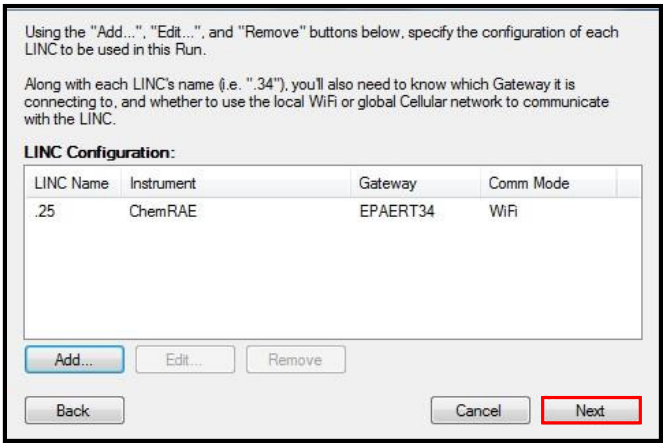
   a. **Cellular** – This option will use the Gateway's Cellular Air Card/SIM card to send the data to the laptop or virtual machine running Survey Controller. This allows the Survey Controller software to be outside of the Gateway WiFi range.
   Use this option if there is good cellular coverage, long distances between where the equipment is deployed and where the survey controller software will be running and if you are using a virtual machine. *(Reminder, LINCs must always be within WiFi range of the Gateway. This option configures communication between the Gateway and Survey Controller only)*



   b. **WiFi** – This option will use the Gateway's WiFi signal to send data to the laptop running Survey Controller. In this mode, Survey Controller must be running on a laptop that is within WiFi range of the Gateway and on the same WiFi network as the Gateway (typically EPAERT1). Use this option if there is poor or no cellular coverage. Only one Gateway should be deployed with this configuration.

5. Click **OK**. The LINC name, instrument associated with the LINC, Gateway and CommMode will then display on the menu.

   Continue adding remaining LINCs and Gateways to the run by following steps 1 through 5 above. ***Note:*** *For adding Generic CAP, see Section Three – Part D below.*



6. Once all the LINCS and Gateways have been added to a run, click **Next**.

Section Three – Part D: Adding Data Sources that don't come from a Traditional LINC (Generic CAP)

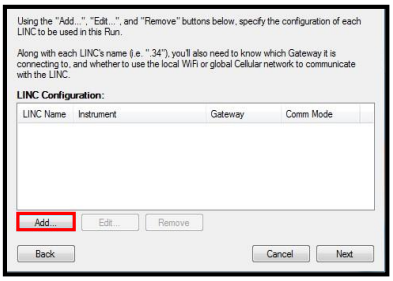
Viper Survey Controller is designed to receive information that is formatted as a CAP XML message. Data sources, such as ProRAE Guardian (AreaRAE Pro, etc.), can be leveraged by pushing the generic CAP message to ERT's PRG2CAP utility (refer to Viper – ProRAE Guardian Setup Guide) that pushes it to Survey Controller. In addition, there are several in-house ERT "Meter Apps" that leverage data that exists on third-party web platforms as well as local databases. The ERT Meter Apps use a variety of methods to acquire both real-time and historic data from these third-party services and translates that data to a CAP message for use in Viper Survey Controller. Some examples include: NOAA MeterApp, USGS Water MeterApp, AirNow MeterApp, ERT In-Situ MeterApp. Please refer to the Viper - ERT CAP Meter Apps Guide for additional information.

The ability to create in-house CAP Meter Apps not only extends the types of instruments that can be used with Viper beyond just those that already have a SafeENV LINC, but also enhances an existing deployment by including additional details such as nearby air quality readings or stream conditions, etc.

The ERT Meter Apps and guides are available for download from https://response.epa.gov/viper. Contact ERTSupport if you require access to the Viper website (ertsupport@epa.gov).

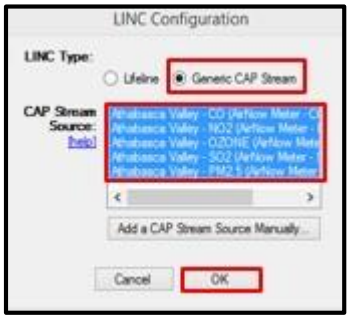
As outlined above, after successfully naming a Run, Survey Controller needs to know which LINCs, Gateways and/or Generic CAP Streams (inventory) will be deployed. Survey Controller can support multiple LINCS/Gateways and Generic Cap Streams.

1. Click **Add** on the LINC Configuration screen.

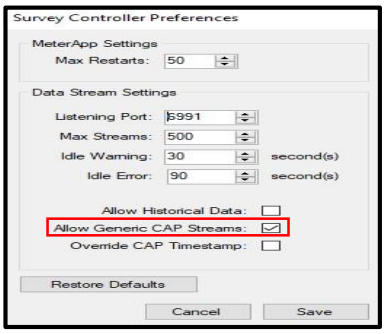


2. Click the Radio Button for 'Generic CAP Stream'

3. In the CAP Stream Source box, select all desired sources**.** Click OK. ***Note:*** *To select multiple lines at once, hold down the Ctrl key and select each desired source, or select the first line, hold down the Shift key and select the last line to select all sources.*



4. If the Generic CAP Stream radio button is not available, from the Run menu in Survey Controller, Select Run | Preferences and place a checkmark in 'Allow Generic CAP Stream'. Click 'Save'.

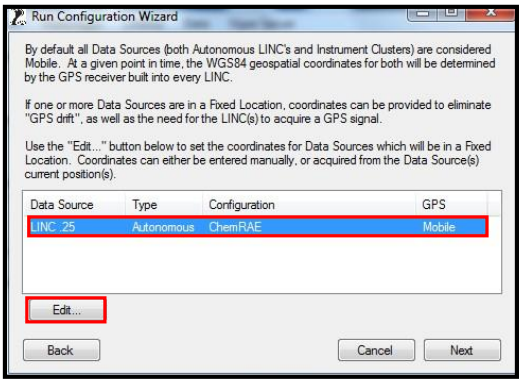


5. Once all the LINCS/Gateways and Generic CAP Streams have been added, click **Next**.

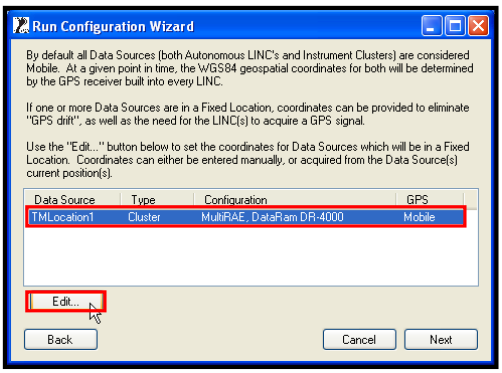
Section Three - Part E: Set Reading Interval and GPS Mode

Setting the Reading Interval (i.e., seconds, minutes, hours, days, All Readings) and GPS Mode (Mobile or Fixed) both for clusters and for individual LINCs/instruments is done inn **Survey Controller**.

1. To edit the Reading Intervals and GPS Mode for each LINC (or Cluster), select the Data Source (LINC or Cluster), and then click **Edit**



Example: Single (Autonomous LINC)

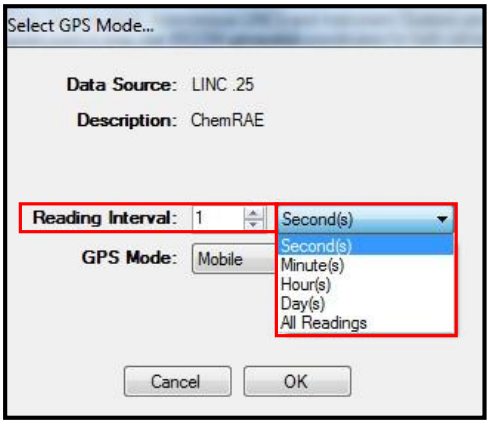


Example: Cluster

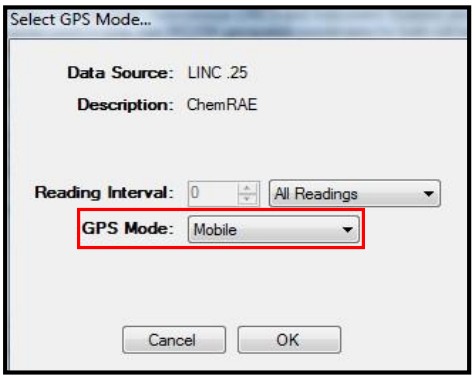
Note: *By default, all Data Sources (LINCs) are considered Mobile. The geospatial coordinates will be determined by the GPS receiver built into every LINC. If one or more of the Data Sources (LINCs) are in a Fixed Location, coordinates can be provided to eliminate "GPS drift", as well as the need for the LINC(s) to acquire a GPS signal. See Item #3 below.*

2. In the Reading Interval section, select the interval at which data will be recorded by the VIPER Survey Controller software.

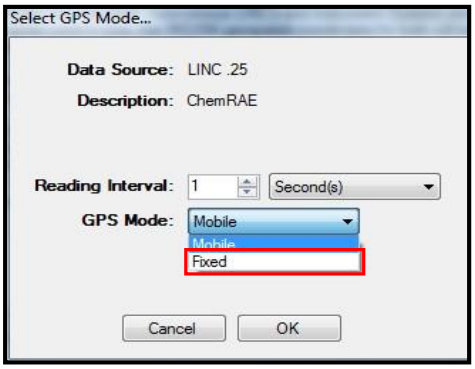
   Selecting **All Readings** will record data at the same rate that the instrument is transmitting readings.



3. In the GPS Mode drop down menu, select either Mobile or Fixed

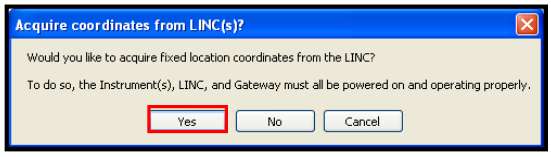


   a. **Mobile**: If the LINC/Instrument will be moving, select **Mobile** (the default setting). With this setting, the geospatial coordinates will be obtained by the GPS receiver built into the LINC.

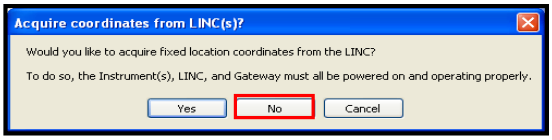


   b. **Fixed**: If the location of the LINC/instrument will not change throughout the duration of the run, select **Fixed** from the GPS Mode menu.

      There are two ways to add Fixed Coordinates - using the GPS receiver built in to the LINC or manually entering the coordinates.

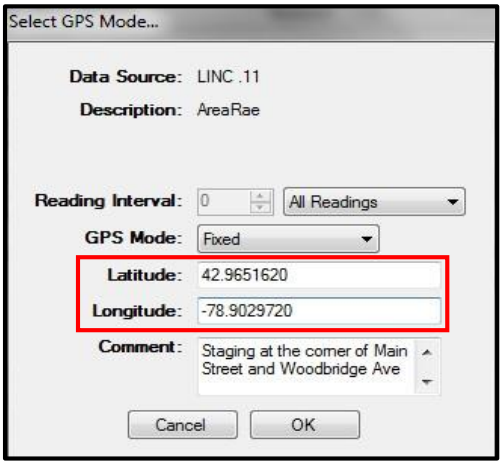


      i. Select **Yes** if Fixed coordinates are to be acquired from the LINC. *This option requires the LINC and Gateway to be powered on and operating correctly*.

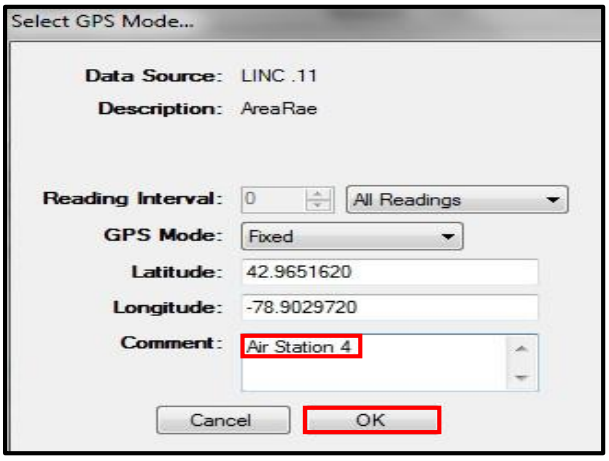


      ii. Select **No** if Fixed coordinates will be manually entered. (For example, GPS coordinates were captured with another device such as a Trimble).

      Manually enter the coordinates



4. You can also add additional information in the Comment field. This is especially helpful to anyone viewing the run in Deployment Manager.



5. Click **OK**.

6. Click **Next**.

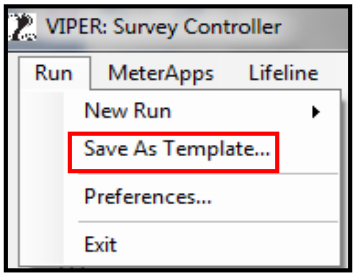
7. Click **Finish** to complete the Run Configuration.

8. The ***Begin Recording Data?*** dialog box will be displayed. If all instruments are deployed and operational, click **Yes** to begin recording data. If instruments are not fully operational at this point, click **No**. The **Record Button** can be selected later on the Survey Controller screen to begin recording data when ready.

Section Three – Part F: Saving and Creating a Run from a Template

After a run has been started, it can be saved as a Template. Subsequent Runs for a deployment can be started from saved Templates rather than from Scratch each time. A Template stores the Equipment (Instruments, LINCs & Gateways), GPS coordinate details and Reading Interval information from a Run. The steps below describe the process of Saving a Template and starting a Run from a Template.

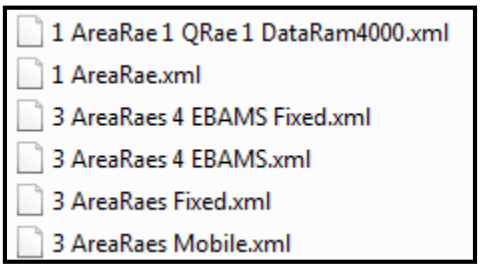
Saving a Run as a Template:



1. Open VIPER Field Survey Controller
2. From the Run Menu, select **Run**>**Save As Template**. Templates can be saved when a run is active or they can be saved when a run has stopped. Be sure to save the template before starting a new Run.
3. You will be prompted to give the Template a name. See paragraph below for suggested naming conventions. By default, templates are saved to C:\Program Files (x86)\VIPER\VIPER Field Survey Controller\RunTemplates.

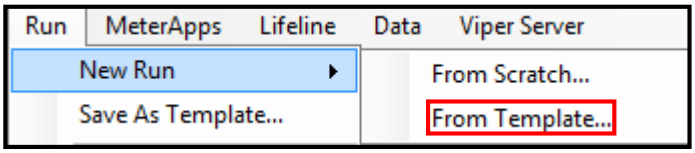
Suggestions for naming Templates:

Several templates can be associated with one project. For example, one project configuration may include deploying 3 AreaRaes and 4 DataRams and another configuration may include only deploying 3 AreaRaes. When each of those runs are created the first time, they can be saved as a Template. By naming the template with the instrument in the configuration, it will be easy to distinguish one Template from another when starting a run from a Template.



Creating a Run from a Template:

After a Run has been saved as a template, that template can be applied when creating future Runs

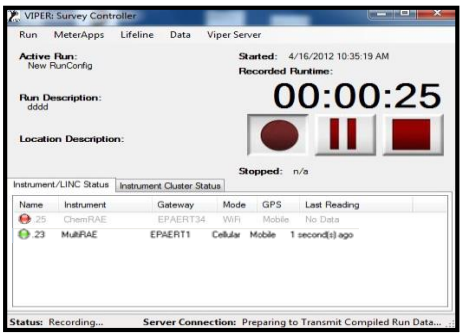


1. Open VIPER Field Survey Controller
2. From the Run Menu, select **Run**>**New Run**>**From Template**
3. Select the appropriate Template for the deployment configuration.
4. Continue through the run configuration wizard and refer to the steps earlier in this section if changes need to be made to the run configuration.

Section Four – Survey Controller

Section Four - Part A: Recording Data

When the run configuration wizard is completed, the following screen will be displayed.

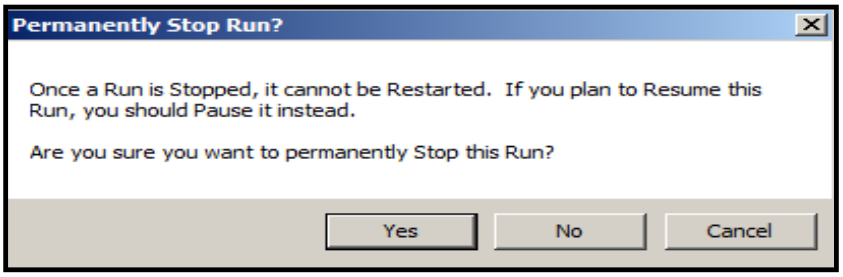


Record Data Button: Select this button to begin recording data. A MeterApp will launch for each instrument and data will be sent to Survey Controller.

Pause Button: After a Run has been started, data collection can be paused by clicking this button. When a Run is paused, no readings are being captured. The pause button can be used for several different situations. For example, rather than stopping a Run at the end of the day and starting a new Run the next day, the Run can be paused instead. As long as Survey Controller remains open, the Run can be restarted the next day, thus saving the time of starting a new Run.

Pausing a run stops all data from being recorded. In the situation where instrument specific readings should not be captured, pausing a run might not be the best option. For example, if infield calibration is being performed on one instrument, but data should continue to be collected for other deployed instruments, pausing the entire Run would not be appropriate. Instead, powering off the LINC to the instrument in question would stop data from being captured for just that instrument. Readings from all other instruments would continue to be captured.

Stop Button: Press the Stop Button to completely end a Run. It is necessary to end a run in order to change a Run configuration – for example, to add instruments or change the communication mode of the Gateway. Once a Run has been stopped, data recording will not begin again until a new Run is created. When the Stop button is selected, the following dialog box will be displayed:

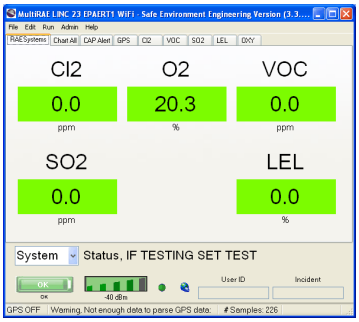


Section Four - Part B: Determining if the Run is Fully Operational

When a Run is started and data is being recorded, the steps below outline what is expected from a fully operational Run. If any of the actions below do not occur as expected, reference *Basic Troubleshooting in Section Nine and Ten of this Guide*

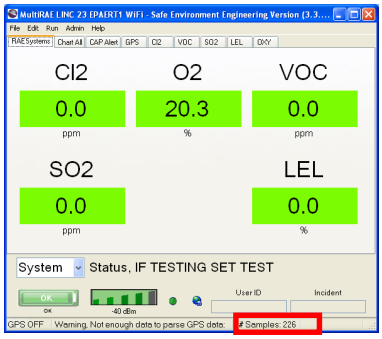
The steps below assume the Run Configuration Wizard is completed, the Record Data button in Survey Controller is activated and all instruments, LINCs and Gateways are powered on.

1. A MeterApp for each instrument should launch Full Screen – similar to the image to the right.

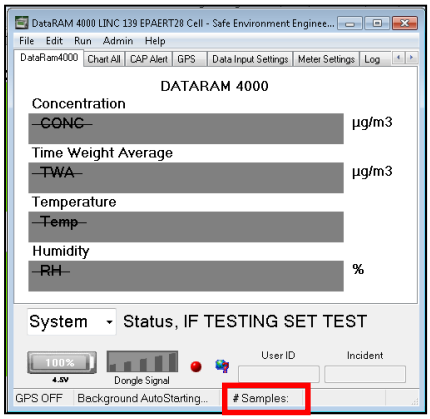


If the MeterApp launches minimized to the toolbar instead of full screen, there is a communication issue between the Survey Controller computer and the LINC

2. MeterApps should have green highlights around the sensor readings. Also, the "# of Samples" at the bottom of the MeterApp should be incrementing.



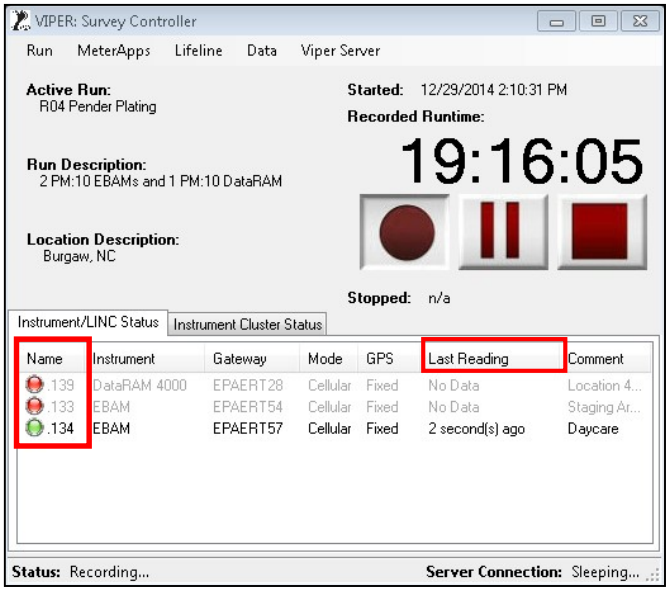
If the MeterApp sensors don't turn green and the "# of Samples" at the bottom of the MeterApp does not increment, there is a communication problem between the LINC and the Instrument. (*Note: sometimes the sensor highlighting will turn grey and the number of samples will continue to increment. This is usually <u>not</u> a problem but a small glitch in the MeterApp*)



3. Survey Controller LINC Lights indicate the quality of the connection to the LINC. Quality of connection includes the quality of GPS coordinates received from the LINC as well as sensor readings received from the LINC.

   If a light is not Green, check the "Last Reading" column to identify the issue.

   Survey Controller will not record data until a LINC has at least one set of coordinates.



   Green with Fixed GPS indicates that instrument data is successfully flowing to Survey Controller

   Green with Mobile GPS indicates that both GPS and instrument data are successfully flowing to Survey Controller.

   A Yellow Light with "Stale GPS" displayed in the Last Reading column indicates that the GPS signal has been lost. Data will continue to be captured in this situation. Survey Controller will apply the last known set of coordinates to data that is collected when the GPS signal from a LINC has been lost. This scenario should only happen when a LINC is configured to obtain Mobile GPS coordinates. When the GPS Signal returns, the light will turn green.

   A Yellow Light without "Stale GPS" displayed in the Last Reading column indicates that the last reading received by Survey Controller is over 30 seconds old. If this state persists, the light will turn Red. (30 seconds is the default and can be changed in Survey Controller).

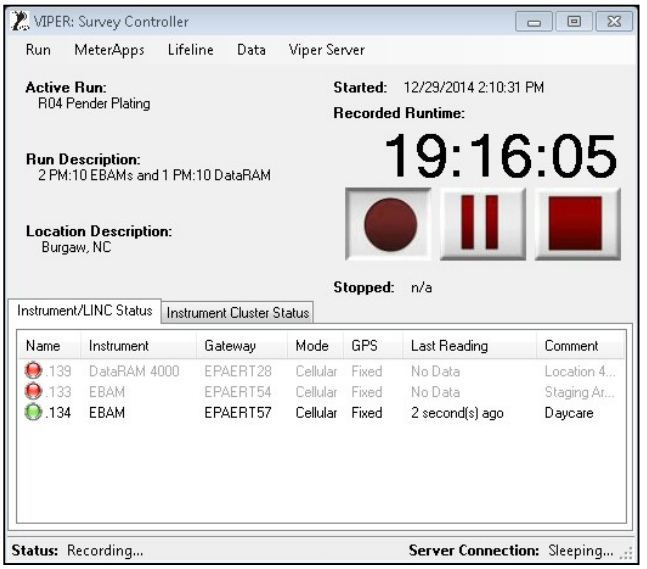
   Red with "No GPS' displayed in the Last Reading column indicates that GPS Coordinates have not been received for this LINC. When configuring the Run, the LINC GPS was set to Mobile. This Red light indicates an issue with the LINC GPS. To temporarily bypass the LINC GPS, right-click on the LINC and enter fixed coordinates in order to begin capturing data. If coordinates are unknown, entering 0,0 for latitude and longitude will be sufficient to begin recording data. However, those records will not be tied to a valid location. As such, entering 0,0 should only be used as a last resort until valid coordinates are available. To change coordinates after bypassing the LINC GPS, the Run will need to be stopped and a new Run will need to be started.

   Red with "No Data" displayed in the Last Reading column indicates that Survey Controller is not communicating with a LINC. Troubleshooting would begin with determining the state of the MeterApp followed by troubleshooting the LINC and Instrument.

   Red without "No Data" displayed in the Last Reading column indicates that the last reading received by Survey Controller is over 90 seconds old. Troubleshooting would begin with determining the state of the MeterApp followed by troubleshooting the LINC and Instrument. (90 seconds is the default and can be changed in Survey Controller)

Section Four - Part C: Survey Controller Status

Survey controller displays several different status indicators that help determine how a run was configured and if everything is operational.



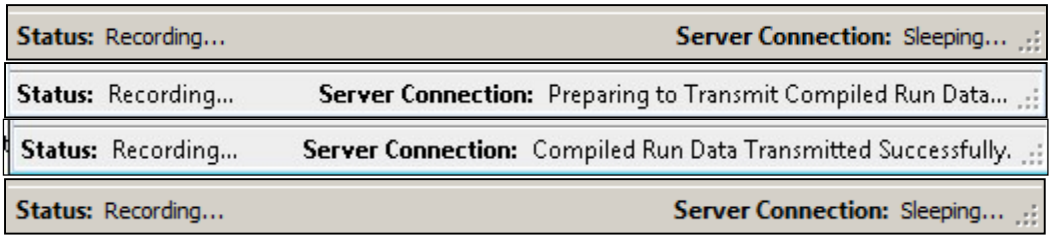
Mode: The Mode column displays how the LINC is configured to send data to Survey Controller. A Cellular mode indicates that the LINC will send data to Survey Controller over the Gateway Air Cards to a computer that is on the internet and not on the WiFi network of the Gateway. WiFi Mode indicates that the LINC will send data to a Survey Controller computer that is on the Gateway WiFi network (EPAERT1) and not on an outside internet connection.

GPS: The GPS column displays if LINC coordinates are stationary for a Run (Fixed coordinates) or if Mobile GPS coordinates will be obtained from the LINC.

Last Reading: The Last Reading Column indicates when instrument data was last received in Survey Controller. This is a good column to monitor for any instrument or telemetry issues that might arise.

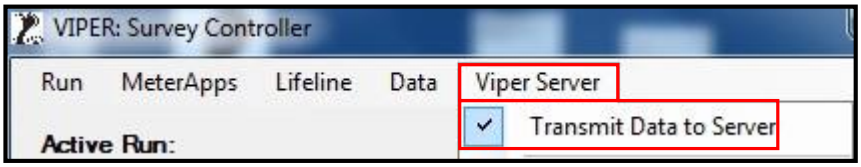
Status: At the bottom of the Survey Controller window, the Status indicates the state of the current Run. The status is either Recording, Paused or Stopped.

Server Connection: At the bottom of the Survey Controller window, the Server Connection indicates if data is successfully being sent to Viper.NET. When the Survey Controller computer has an internet connection, data should be sent to Viper.NET every minute. Survey Controller will indicate “Sleeping” for one minute and then will change to “preparing data”, “compiling data” and “sending data”. When data is successfully sent, Survey Controller Server Connection will return to Sleeping for another minute and repeat the process.



NOTE: It is important that data be sent regularly from Survey Controller to Viper.NET to insure the local database does not exceed storage capacity.

If the Server Connection shows that Data Transmission has been Disabled, select the Viper Server menu option and enable Transmit Data to Server

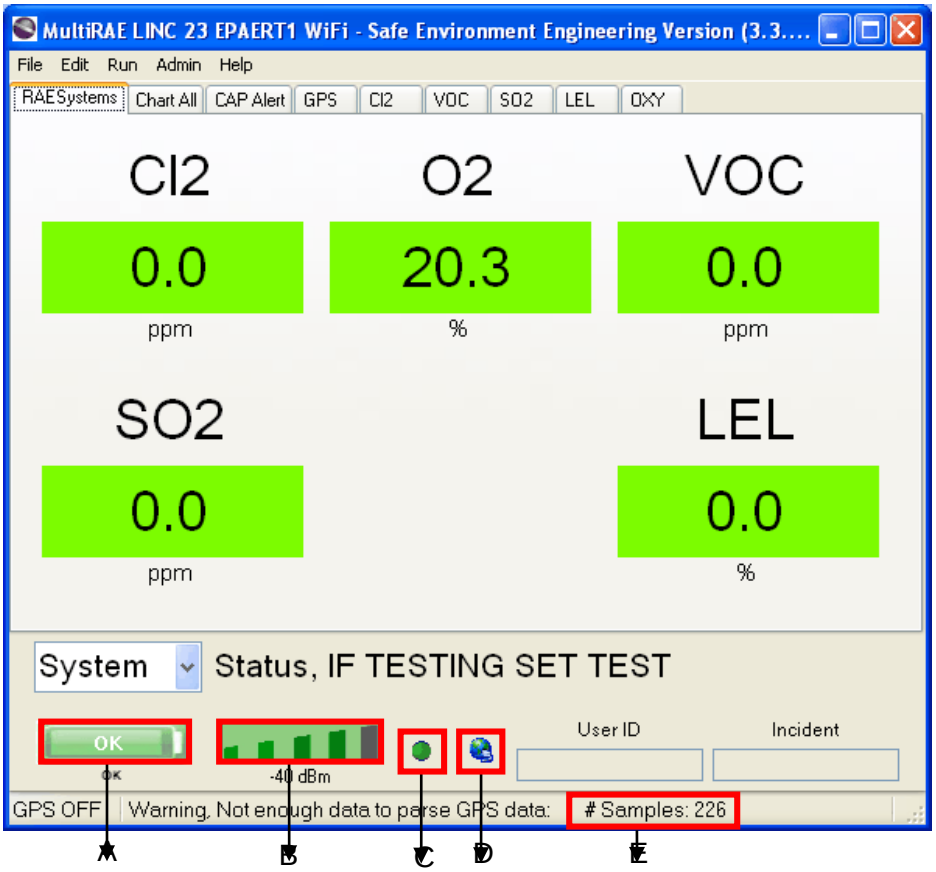


Section Five – MeterApps

Section Five - Part A: MeterApp Overview

Once recording data begins, the VIPER Survey Controller software will automatically launch the MeterApp window for each LINC/instrument pair in use. Meter Applications is a class of software whose purpose is to receive the instrument signal and convert it into a CAP message for sending to Survey Controller. The following is an example MeterApp window for a MultiRAE.

The main display indicates the current readings for the instrument sensors. If the sensor names are not configured or need to be re-configured, see Part B below on changing sensor labels.



A: Battery life of the LINC

B: Signal strength between the LINC and Gateway

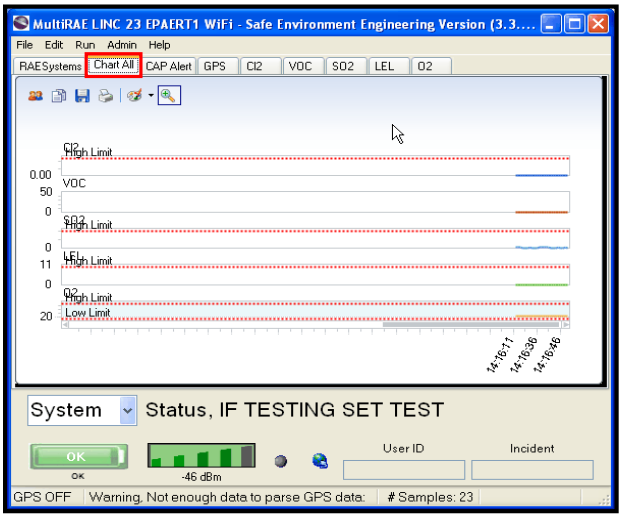
C: Data connection between the LINC and instrument. (*Green/Red*)

D: Network connection status

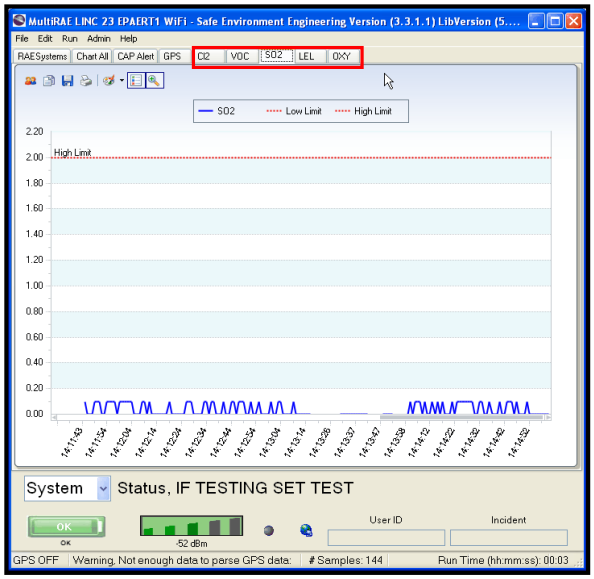
E: Number of instrument readings received. This number should increment during an active run.

Other MeterAPP tabs:

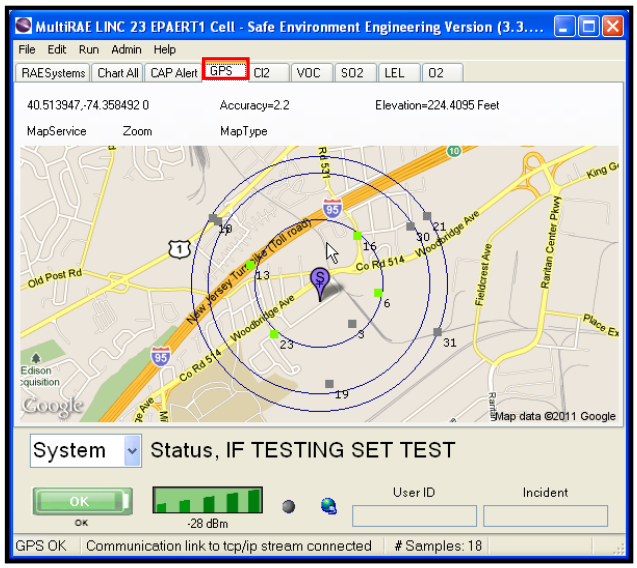
To navigate between windows within a MeterApp, select a tab at the top of the screen.



The Chart All tab displays trend line graphs of ALL of the sensor readings.



Selecting an individual sensor tab will display a trend line graph for that sensor



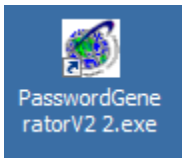
The GPS tab will display the last recorded location obtained from the LINC (mobile)

Section Five – Part B: MeterApp Sensor Configuration

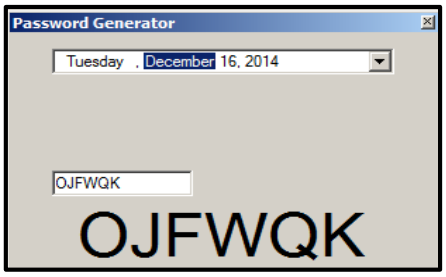
Certain instruments require the sensor labels be manually entered in the MeterApp. For example, the sensor names in an AreaRAE will always need to be manually configured the first time the MeterApp launches in a new deployment.

The steps below assume a new Run has been started in Deployment Manager and the MeterApp has launched full-screen and is showing Green boxes for each sensor. In addition, the steps below assume that the "Password Generator v2.2" software has been installed on the computer running Survey Controller. If the Password Generator software is not already installed, it can be downloaded from www.response.epa.org/viper.

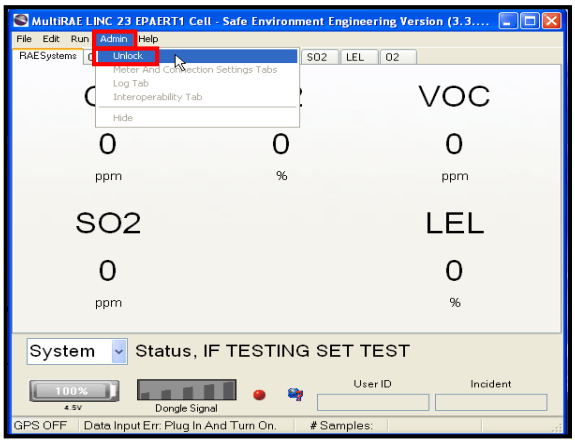
1. **Run the Password Generator Program**



A window containing the password needed to unlock the MeterApps will be displayed. This password is valid for the remainder of the day.

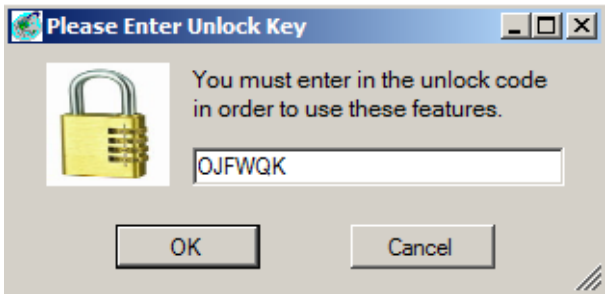


2. In the MeterApp window, Click on the **Admin Tab** and select **Unlock**



3. **Enter the Unlock Code** displayed in the Password Generator window and click **OK**

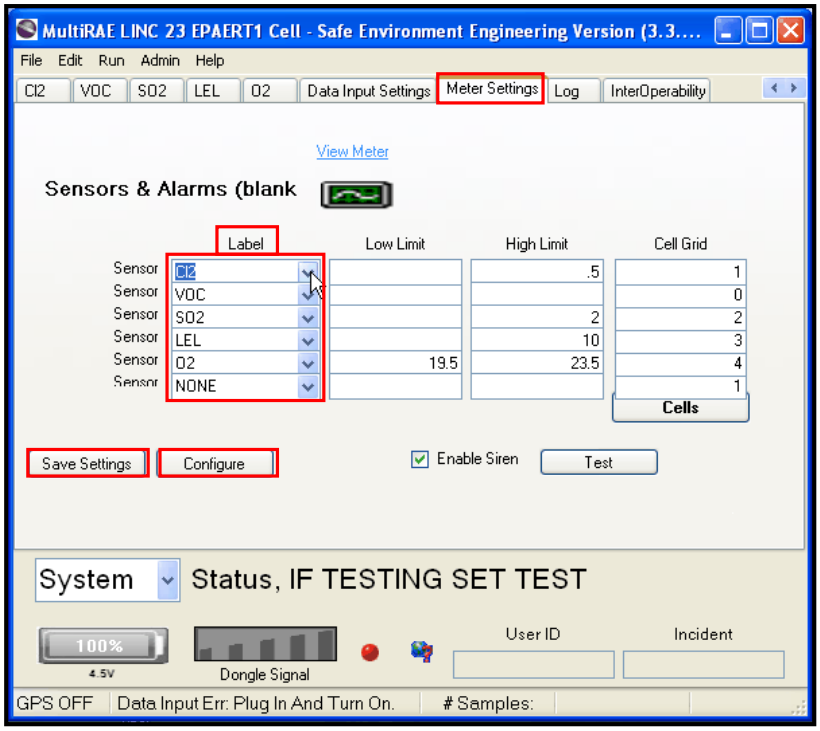
Several new tabs will be displayed in the MeterApp when it has been unlocked.



4. Click on the **Meter Settings** tab.
5. Under the **Label** column, use the drop down menu to select the sensor that is installed in the instrument. AreaRAE sensors are read from top to bottom, left to right in the instrument display.

   NOTE: Make sure sensors are listed in the right order (i.e., mimic the instrument display)

6. Click **Save Settings**
7. Click **Configure**



8. Close the Meter App window by clicking the X in the upper right corner. The MeterApp will automatically restart with the new changes in effect.

Section Five – Part C: MeterApp Alarm Configuration

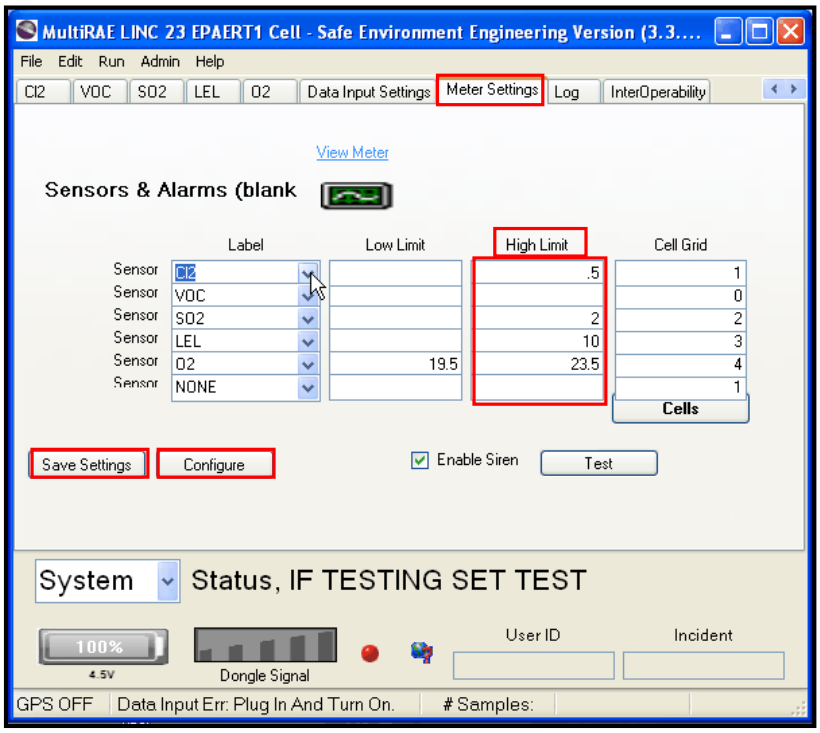
MeterApps can be configured to “alarm” when sensor readings reach certain values. When a MeterApp is in an alarm state, the sensor will turn Red and a siren can sound on the computer running Survey Controller.

MeterApp Alarms are configured in the Meter Settings tab. Both low and high alarms can be entered for each sensor.

MeterApp alarms can also be used in conjunction with setting reading intervals in Survey Controller to reduce the number of “0” readings. Survey Controller will capture and send readings at the intervals configured when the Run was created. Survey Controller will also capture send readings that were identified as “alarms” in the MeterAPP, regardless of the reading interval. So, a convenient way to reduce the number of “0” readings captured is to set reading intervals in Survey Controller to something other than “all readings” (for example 1 minute) and to configure the MeterAPP high alarm level to .1. Essentially that combination will record and send a reading every minute as well as any non-zero readings that occur in between the reading interval time.

<u>Setting MeterAPP Alarm Levels</u>

1. **Unlock the MeterAPP** (*See section above for instruction on unlocking a MeterAPP*)
2. Switch to the **Meter Settings** tab
3. Enter high and/or low alarm limits as needed
4. Click **Save Settings**
5. Click **Configure**



Section Five – Part D: ERT CAP MeterApps

Viper Survey Controller is designed to receive information that is formatted as a CAP message. As such, ERT has developed several in-house "Meter Apps" which leverage data that doesn't come from a traditional link and exists on third-party web platforms as well as local databases. The ERT Meter Apps use a variety of methods to acquire both real-time and historic data from these third-party services and translates that data to a CAP message for use in Viper Survey Controller.

The ability to create in-house CAP Meter Apps not only extends the types of instruments that can be used with Viper beyond just those that already have a SafeENV LINC, but also enhances an existing deployment by including additional details such as nearby air quality readings or stream conditions, etc.

The ERT Meter Apps and guides are available for download from https://response.epa.gov/viper. Contact ERT Support if you require access to the Viper website (ertsupport@epa.gov). Below is a list of ERT's current in-house MeterApps. For additional information on these MeterApps, please refer to the ERT CAP MeterApps guide located on the response.epa.gov/viper website.

- USGS Water MeterApp
- AirNow MeterApp
- NOAA MeterApp
- InSitu MeterApp
- Environet MeterApp
- TAGA (Trace Atmospheric Gas Analyzer) MeterApp
- MesoWest MeterApp
- Envista Meter

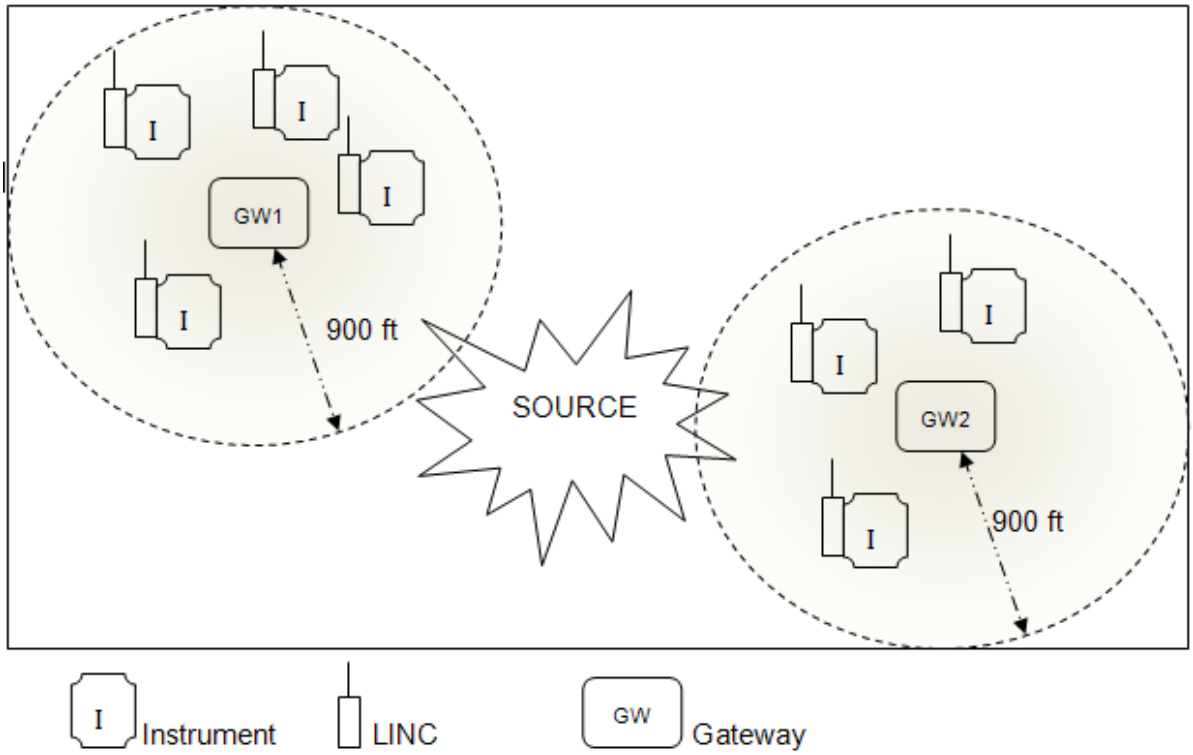
Section Six: Best Practices for Different Monitoring Configurations

Section Five Objective: In the field, there are several different monitoring configurations that may work best depending on the situation. Possible configurations are 24/7 stationary perimeter monitoring, workday stationary monitoring, mobile monitoring, and multiple team monitoring. The following section will provide insight into the best setups and practices for each of these.

Note: the 900' gateway Wifi range given here is under the best circumstances, when all LINCs are in the line of sight of the gateway and there is no interfering structures or buildings. Ideally, the user will want to put the gateway at a fairly high point in the monitoring area.

Section Six – Part A: 24/7 Stationary Perimeter Configuration

Scenario: 24/7 Stationary Perimeter Monitoring
Diagram:

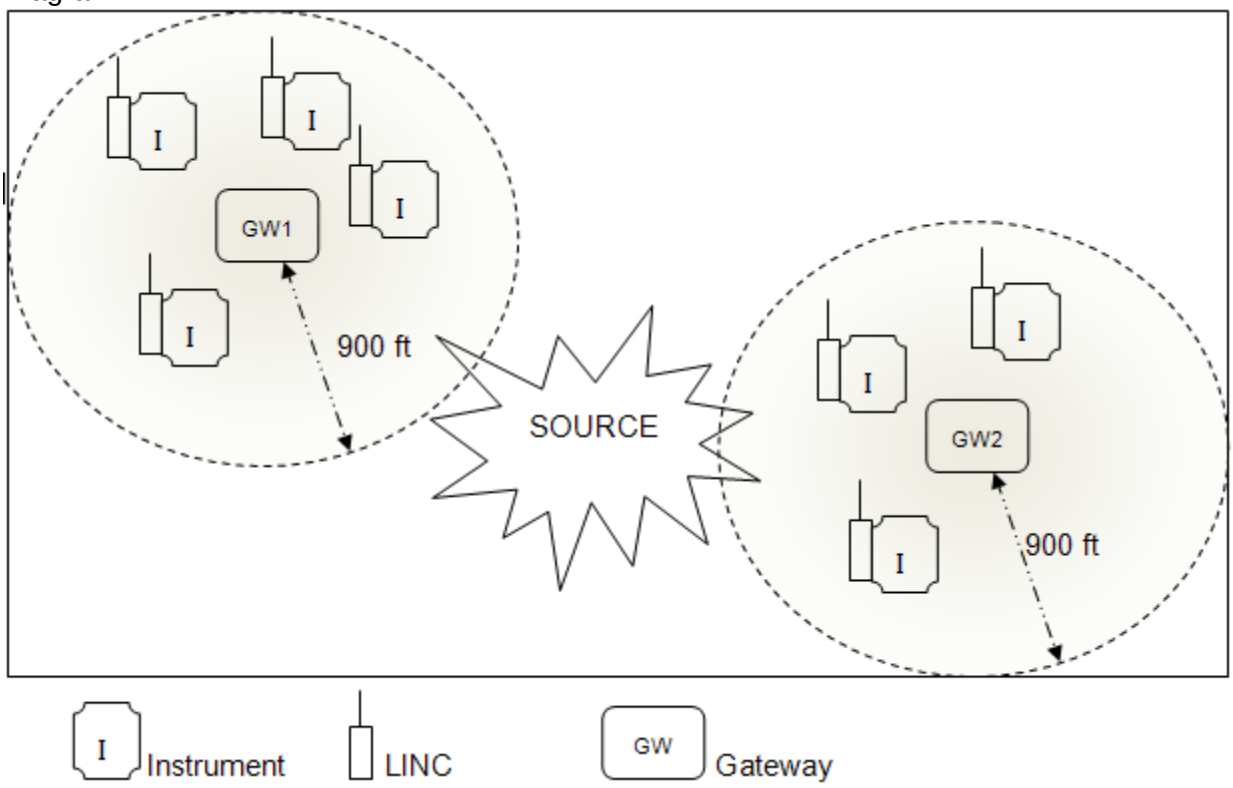


Description: This is a stationary monitoring setup in which the Gateways and their corresponding LINC/Instrument pairs remain in a fixed place. The monitoring remains constant (24/7) throughout the duration of the run, pausing only to calibrate or run bump tests
Equipment (pictured): 2 Gateways, 7 LINCs, 7 Instruments

<u>Survey Controller Configurations</u>
Stationary/Mobile: All stationary
Recording interval: Constant
Cluster(s) (pictured): 0 clusters
Start/stop run: Start run at the beginning of the monitoring project; do not stop until completely finished
Pause: When performing calibration or bump testing

Section Six – Part B: Workday Stationary Monitoring

Scenario: Workday Stationary Monitoring
Diagram:



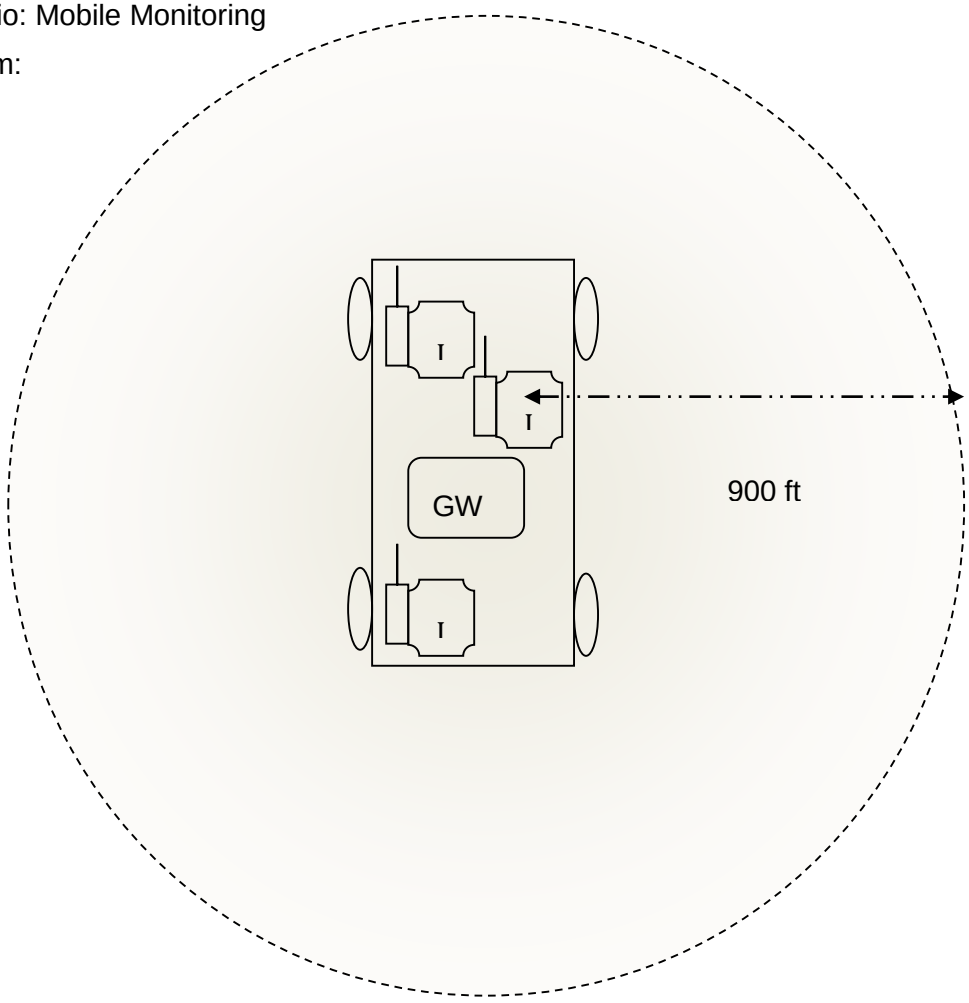
Description: This type of monitoring lasts for the duration of a workday. It is useful in generating TWAs. The runs for this monitoring start at the beginning of the workday and are stopped at the end.
Equipment (pictured): 2 Gateways, 7 LINCs, 7 instruments

Survey Controller Configurations
Stationary/Mobile: All stationary
Recording Interval: Length of the workday (e.g., 8 hours)
Cluster(s) (pictured): 0 clusters
Start/stop run: Start at the beginning of workday and stop at the end of a workday
Pause: When performing calibration or bump testing

Section Six – Part C: Mobile Monitoring

Scenario: Mobile Monitoring

Diagram:



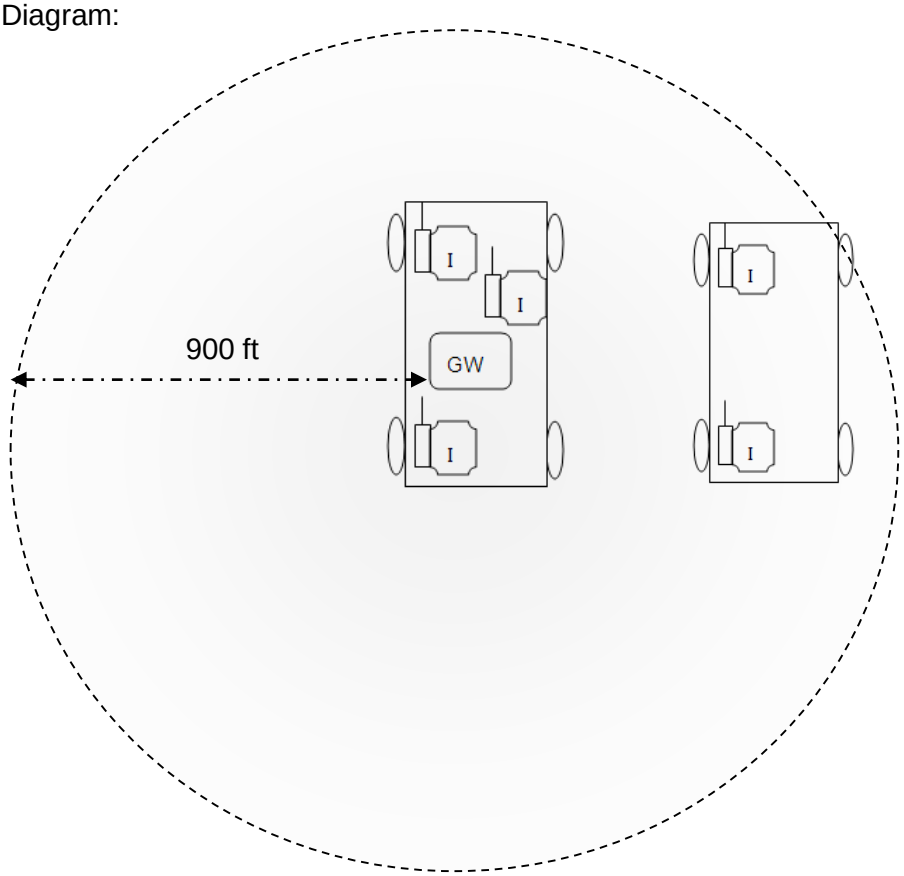
Description: A gateway and its LINCs/instruments are all joined on one mobile system (i.e., a modified RC vehicle). A cluster is created so that one geographical location is used for all LINCs/instruments.
Equipment (pictured): 1 Gateway, 3 LINCs, 3 instruments, 1 vehicle
Note: If in Wi-Fi mode: also need laptop in the vehicle

Survey Controller Configurations
Stationary/Mobile: Mobile
Recording Interval: As needed
Cluster(s) (pictured): 1 cluster
Wi-Fi/cellular: Survey Controller can run in Wi-Fi mode if the laptop is in the vehicle. Otherwise, cellular mode must be used.
Stop/stop run:
Pause run: When performing calibration or bump testing, or to take a break.
Note: there is a .KMZ link on Survey Controller for mobile runs

Section Six – Part D: Multiple Team Monitoring

Scenario: Multiple Team Monitoring

Diagram:



Description: Two or more teams (sets of LINCs/Instruments) share the signal from one Gateway. Typically this involves 2 or more mobile clusters within range of one Gateway signal. Equipment (pictured): 1 Gateway, 5 LINCs, 5 instruments, 2 vehicles

Note: If in Wi-Fi mode: also need laptop in the vehicle

<u>Survey Controller Configurations</u>
Stationary/Mobile: Mobile
Recording Interval: As needed
Cluster(s) (pictured): 2 clusters
Wi-Fi/Cellular: Survey Controller can be run in Wi-Fi mode if the laptop is in the vehicle. Otherwise, cellular mode must be used.
Note: there is a .KMZ link on Survey Controller for mobile runs

Section Six – Part E: Gateway Meshing

Overview:

In a Viper implementation, Meshing is the practice of using multiple Gateways to extend the local WiFi range (EPAERT1) to allow greater distance for deploying Lincs and instruments when a cellular network is not available or when only a single air card is available. This extended WiFi range is achieved by deploying one Gateway and placing the next Gateway just inside the outer WiFi range of the first gateway. The Gateways will dynamically connect and self-configure to perform like one large WiFi network and not two independent networks. This process can be repeated with additional gateways to extend the WiFi network as needed. A Viper laptop connected to the EPAERT1 network will be able to acquire data from Lincs deployed anywhere in the Meshed network.

If cellular internet is not available, a Survey Controller run will be configured as a "WiFi" run. All Lincs can be paired to the same Gateway regardless of which Gateway they are nearest. The Mesh network is essentially one Network so it does not differentiate between the Gateways.

Meshing can also be used when one Gateway has a cellular internet connection and the rest do not. The process of setting out multiple gateways to extend the WiFi range would be the same as mentioned above, but when a Survey Controller run is configured, *all Lincs are paired to the Gateway with the air card,* regardless of which Gateway they are nearest.

Natively, gateways provided by SafeENV are pre-configured for meshing and no changes need to be made to the Gateway. However, if changes have been made to the Rajant Radio configuration of a Gateway causing it not to mesh, see the steps below for troubleshooting.

Gateway Troubleshooting

In order for the Gateways to Mesh properly, the following needs to be set up on the Gateways prior to deploying them on site. Gateways should have arrived from SafeEnv pre-configured to mesh automatically. If changes have been made to the default configurations, please call ERTsupport to discuss UnitIDs, Channels, etc.

Mesh Sequence (Distance)

The simplest way to test the Mesh sequence is to take a Linc that is powered on and connected to EPAERT1 WiFi (solid WiFi light). Walk away from the Main Gateway towards your next location until you lose the WiFi light (the WiFi light will blink when it is out of range). Take a few steps back until the WiFi light stays solid. This is where the next Gateway in the Mesh sequence should be located (somewhat like a repeater). ***Note****: You can also use the photo option in BC Commander that will show you what MACids are located within your bubble. Contact ERTSupport for additional information.*

Tips and Tricks:

Gateways can have either Rajant firmware v10 or v11. Each firmware version uses a corresponding version of BC Commander Software – BC Commander v10 or v11. Both versions of the software are available for download from Response.epa.gov\Viper. There is no visible way to tell which firmware is installed on a Gateway. Basically, if the Gateway is recognized in BC

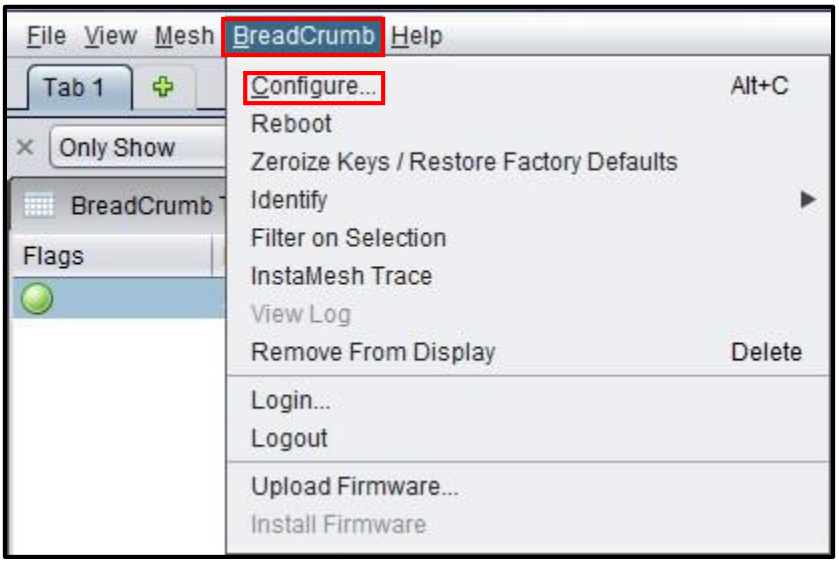
Commander v10, it will have firmware V10. If a Gateway is recognized with BC Commander v11, it will have v11 firmware installed. You may have to install one version and if the Gateway is not recognized, install the other version.

After connecting to a Gateway in BC Commander, the exact firmware version will be displayed. After discovering which version firmware a Rajant radio is using, it is recommended to make note of it by adding a sticker somewhere in the Gateway.

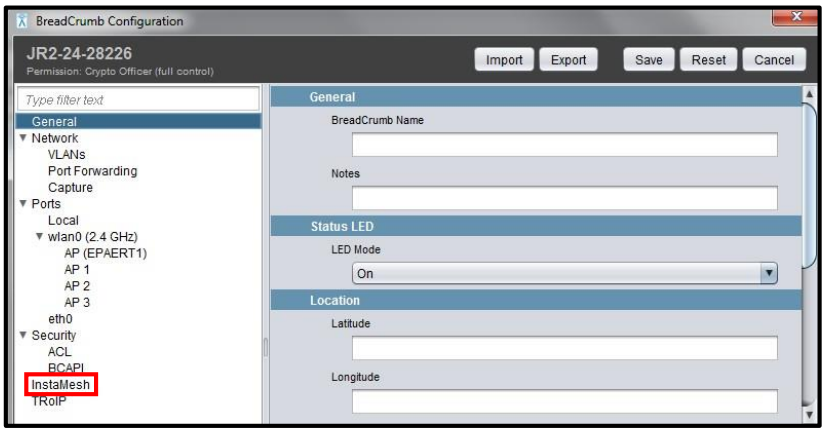
If you have Gateways recognized in both v10 and v11, you can configure Version 11 to 'Enable' v10 Compatibility.

To 'Enable v10 Compatibility:

1. Login to BC Commander (v11)
2. Highlight the Gateway
3. Click on BreadCrumb
4. Select Configure



5. Click on InstaMesh



6. Place a checkmark in Enable v10 Compatibility
7. Click Save

Section Seven: Advanced Telemetry Equipment Configurations

Section Seven Objective: This section addresses how to configure advanced telemetry (LINC and Gateway) equipment settings such as changing the LINC IP address, changing the LINC Baud Rate, Changing the LINC SSID, Remotely Rebooting a LINC, Changing Gateway Configurations in both the WiFi and Aircard routers.

Set up alarms and sensors in Meter Applications.

Section Seven – Part A: Changing the IP Address of a LINC

If equipment is borrowed from another Region with same LINC # as another LINC already in use on-site, one of the LINCs will need to have its IP Address changed to avoid conflicts on the network.

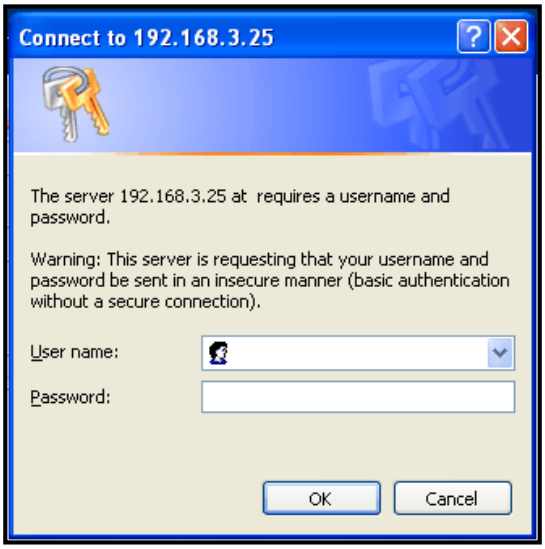
All EPA owned LINCs are configured with IP Addresses that follow this convention: 192.168.3.LINC#. The LINC # should be labeled on the outside of the LINC. So, for example, LINC #51 would have an IP Address of 192.168.3.51 and LINC# 125 would have an IP Address of 192.168.3.125.

Two LINCs in use with the same IP Address would cause a network/communication conflict. Therefore, the LINC # and IP Address of one of the LINCs needs to be changed. REMEMBER to RE-LABEL the outside of the LINC with the new number assigned.

1. Ensure your computer is connected to the Gateway Wi-Fi network (i.e., EPAERT1)
   a. Make sure the Gateway is turned on & functioning – EPAERT1 will be an available Wi-Fi network.
2. Open an internet browser
3. Navigate to http://192.168.3.[LINC#]
   a. [LINC#] will be the number labeled on the side of the LINC. So, to administer a LINC labeled #25, enter 192.168.3.25 in the browser address bar.
4. Enter the User Name and Password:

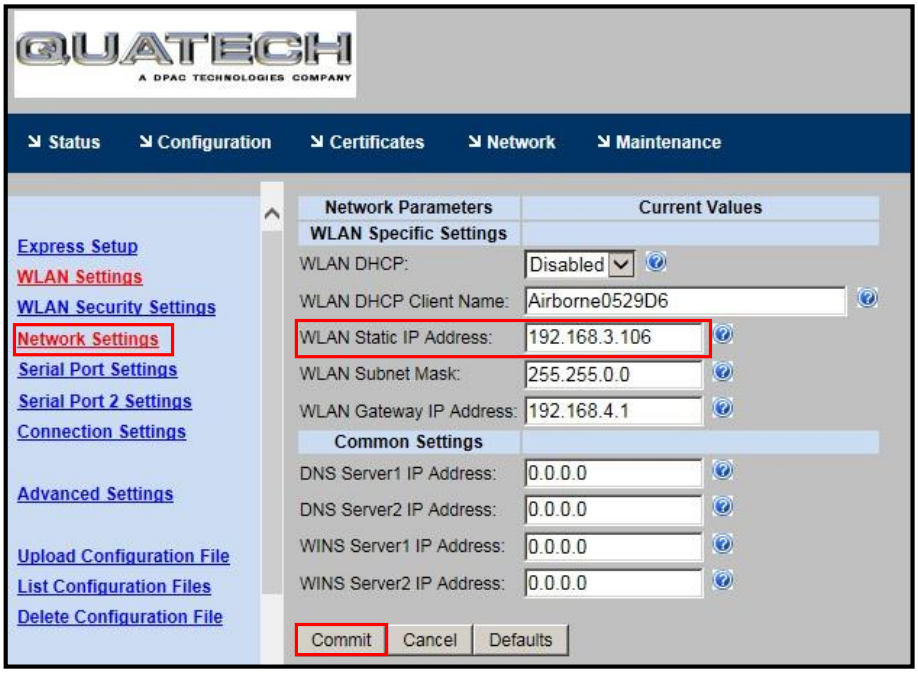
   User name: dpac

   Contact ertsupport@epa.gov to obtain the password



5. To change the LINC IP Address, click on Configuration, **Network Settings.** Under WLAN Static IP Address enter the new LINC # (i.e., 192.168.3.XX)
6. Once the IP Address is changed, click **Commit.**
7. Reboot the LINC.
8. Re-Label the Outside of the LINC with the new number assigned.

Note: WLAN Subnet Mask should be 255.255.0.0 and the Gateway IP Address 192.168.4.1



Section Seven – Part B: Changing the Serial Port Bit (Baud) Rate of a LINC

The bit/baud-rate is the speed at which the LINC communicates with the instrument. The proper Bit/Baud rate is required for successful translation of the readings from the instrument. Certain LINCs are interchangeable and can be used with multiple types of instruments simply by changing the Baud Rate on the LINC to match the requirements of the specific instrument (for example, the same LINC can be used for an AreaRAE or MultiRAE as long as the correct baud rate for each instrument is set in the LINC). It is important to re-label the outside of the LINC with the appropriate instrument type when changing the baud rate.

1. Ensure your computer is connected to the Gateway Wi-Fi network (EPAERT1)
2. Open an internet browser
3. Navigate to http://192.168.3.[LINC#]
    a. [LINC#] will be the number labeled on the side of the LINC. So, to administer a LINC labeled #25, enter 192.168.3.25 in the address bar
4. Enter the User Name and Password

    Username: dpac

    Contact ertsupport@epa.gov to obtain the password

5. Click **Configuration** at the top of the screen
6. On the panel at the left hand side, select **Serial Port Settings**
7. Change the **Serial Port Bit Rate** by clicking the drop down arrow
    a. For an AreaRAE, use the value 19200 bps
    b. For a MultiRAE, use the value 9600 bps
8. Click **Commit** to save and **Restart**.
9. **Re-Label** the outside of the LINC with the appropriate equipment type (i.e., AreaRAE, MultiRAE, etc)

Section Seven – Part C: Changing the WiFi Name (SSID) on a LINC

Caution – this is an advanced task and could render a LINC unable to communicate with Standard EPA Gateways.

Each LINC is configured to communicate with a specific WiFi network. All EPA owned LINCS should be configured to connect to the WiFi network (SSID) named EPAERT1 by default.

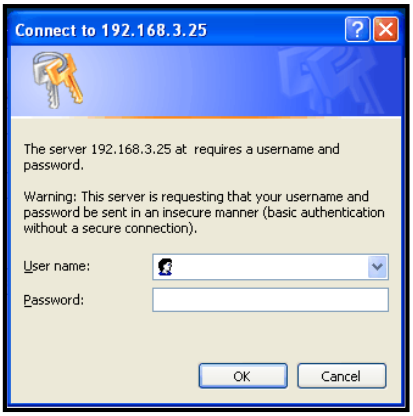
There may be some advanced instances when a LINC will need to connect to a Gateway WiFi network with an SSID (network name) other than EPAERT1. Once a LINC has been changed from EPAERT1, it will no longer be able to connect to any standard EPA Gateways by default. It is important to label the LINC with the new SSID to avoid confusion and assist with reconfiguring the LINC back to EPAERT1 as necessary. If the SSID of a link is unknown, it will be necessary to factory reset the LINC which requires advanced software and configuration knowledge.

The steps below assume that the Laptop and LINC are both connected to the standard EPAERT1 WiFi network.

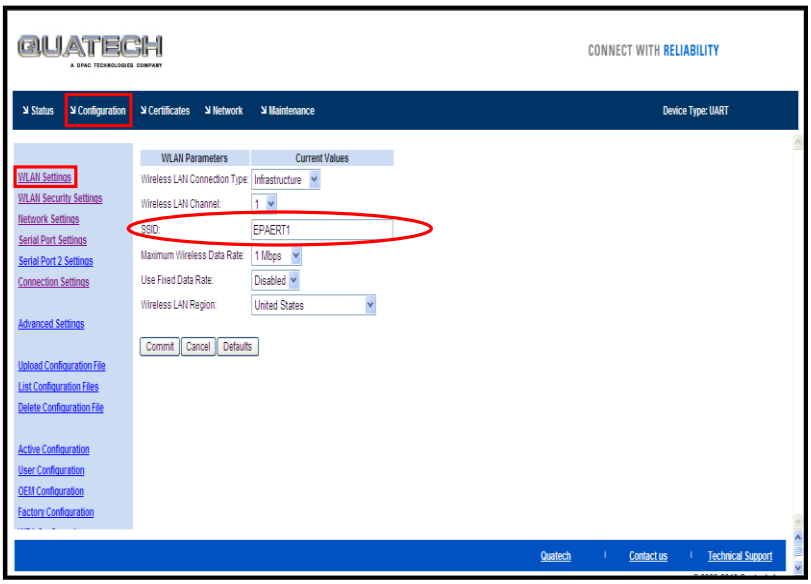
1. Ensure your computer is connected to the Gateway Wi-Fi network (EPAERT1)
2. Open an internet browser
3. Navigate to http://192.168.3.[LINC#]
    a. [LINC#] will be the number labeled on the side of the LINC. So, to administer a LINC labeled #25, enter 192.168.3.25 in the address bar
4. Enter the User Name and Password

Username: dpac

Contact ertsupport@epa.gov to obtain the password



9. From the main screen, go to **Configuration|WLAN Settings.**
10. **Modify the SSID** to the new WiFi network name.
11. Click **Commit and Reboot**. Once this is committed, the LINC can only be accessed from a laptop connected to the new SSID WiFI network and not one connected to EPAERT1
12. **Label the outside of the LINC with the new SSID**



Section Seven – Part D: Remotely Rebooting a LINC

In order to remotely reboot a LINC, the following information is required:

a. Lifeline Gateway Public (cellular) Address: *gateway#.safeenv2.com*LINC # *(e.g. ".102")*

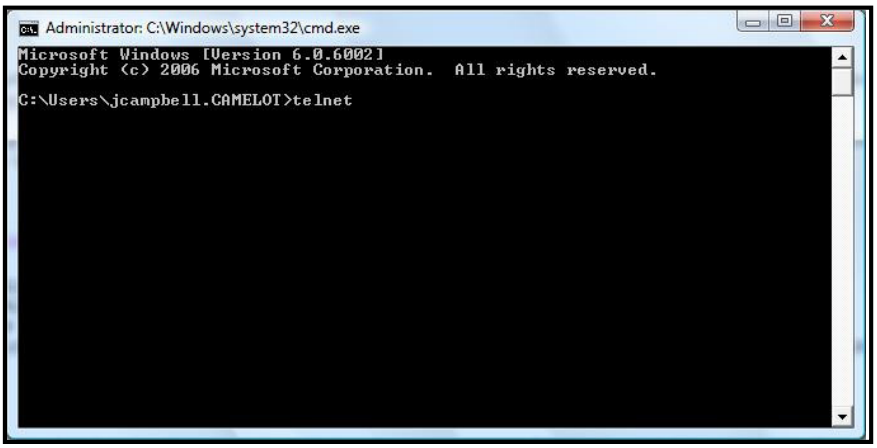
b. *LINC Administration Username and Password*

Username: dpac

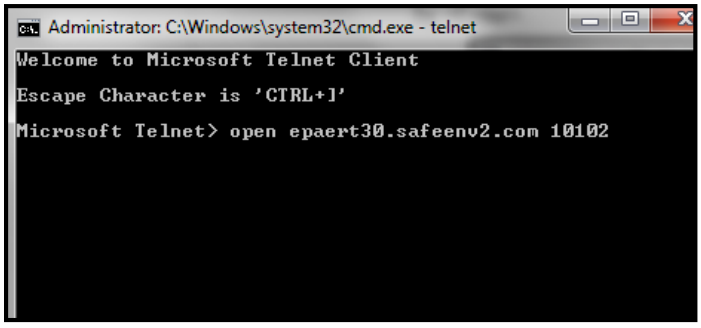
Contact ertsupport@epa.gov to obtain the password

c. From the LINC #, the TCP/IP port of the LINC telnet server can be derived. To do so, use the LINC #, and then add 10000. For example, for LINC #.40, the TCP/IP Port will be 40+10000 = 10040.

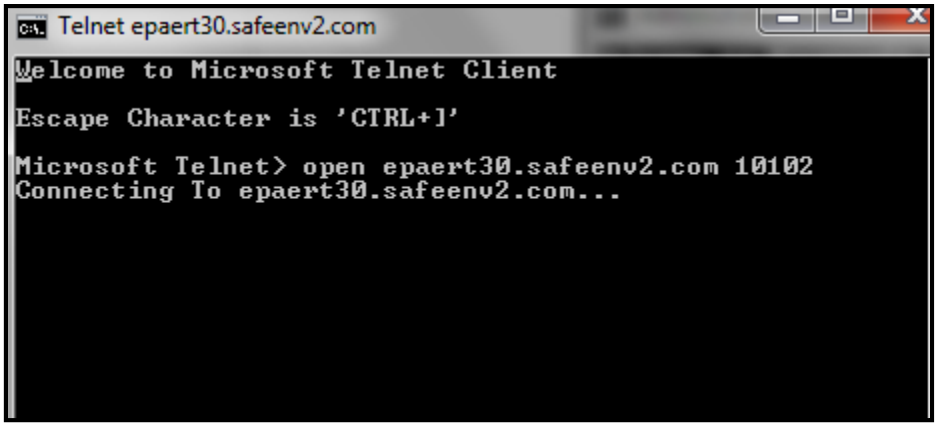
1. First, ensure that there are no active instances of the MeterApp attempting to retrieve data from the LINC.
2. Open a Windows Command Prompt.
   a. This can be done by selecting Start>All Programs>Accessories>Command Prompt, or
   b. Select Start>Run, type "cmd" and click OK.
3. In the Windows Command Prompt, type "telnet", followed by <Enter>.



4. Once in Telnet, type "open [GATEWAY PUBLIC IP] [LINC TELNET PORT]", followed by <Enter>.



5. Wait 20 seconds, and then type “help”, followed by <Enter>. Telnet may or may not appear to respond as you are typing. Once <Enter> is pressed, a list of commands should be returned, confirming that you have connected to the LINC.



If the list of commands is not similar to the screenshot above, scroll up and make sure that Telnet was able to connect to the LINC. If Telnet was unable to connect to the LINC, an “Unable to Connect” message will be visible, followed by a list of commands from Telnet’s help system.

Type “auth [LINC ADMIN USERNAME: dpac] [LINC ADMIN Contact ertsupport@epa.gov to obtain the password]”, followed by <Enter>.

6. Finally, type “restart”, followed by <Enter>. The LINC should end the Telnet session, and reboot. Allow 30 seconds for the LINC to reboot.

7. After allowing 30 seconds for the LINC to reboot, confirm that the LINC has rebooted successfully by either launching its properly configured MeterApp, or by repeating steps 5 and 6. If steps 5 and 6 are repeated, disconnect from the LINC by typing “exit”, followed by <Enter>.
8. Exit from Telnet by typing “close” followed by <Enter>, and then “quit” followed by <Enter>.
9. Finally, type “exit” at the Windows Command Prompt.

Section Seven – Part E: Changing WiFi Network Name (SSID) in the Gateway

Caution – this is an advanced task and could render a Gateway unable to communicate with Standard EPA LINCS.

Gateways contain two routers – one that managers the internet Air Cards and one that manages the WiFi network. LINCS connect to the WiFi network only, so changing the WiFi network of a Gateway will also require the LINCS be changed to match the new WiFi network name. It is recommended that the LINC SSIDs be changed before the Gateway SSID.

It is important to label the Gateway with the new SSID to avoid confusion and assist with reconfiguring the Gateway back to EPAERT1 as necessary.

The instructions below assume that the software necessary to manage the WiFi router in the Gateway (BC Commander Software) is installed on the laptop being used to configure the Gateway. If the software is not installed on the Laptop, it can be downloaded from www.response.epa.org/viper.

1. Verify your computer is connected to the Gateway's Wi-Fi network (EPAERT1 by default). ***CAUTION: Remember to change the SSID on the LINCS before changing the SSID of the Gateway***

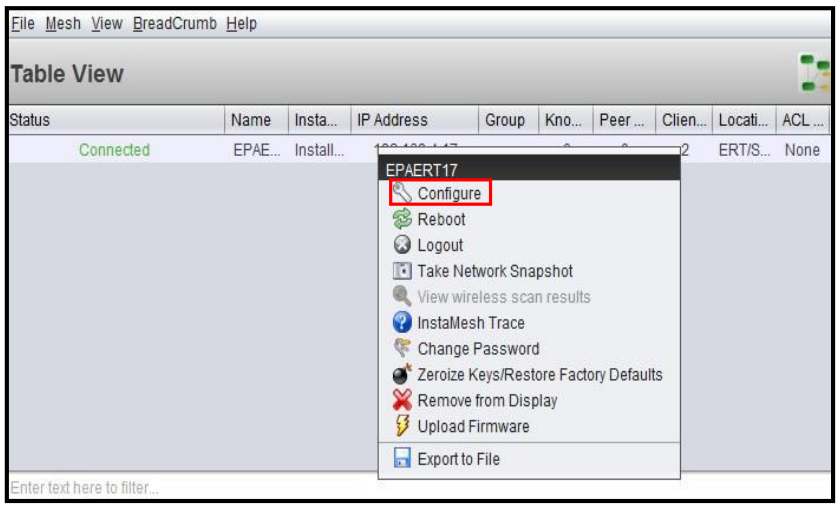
2. Open BC Commander 

3. You will be prompted to enter the username and password. From the User Dropdown menu select:

   User: co (Crypto Officer)

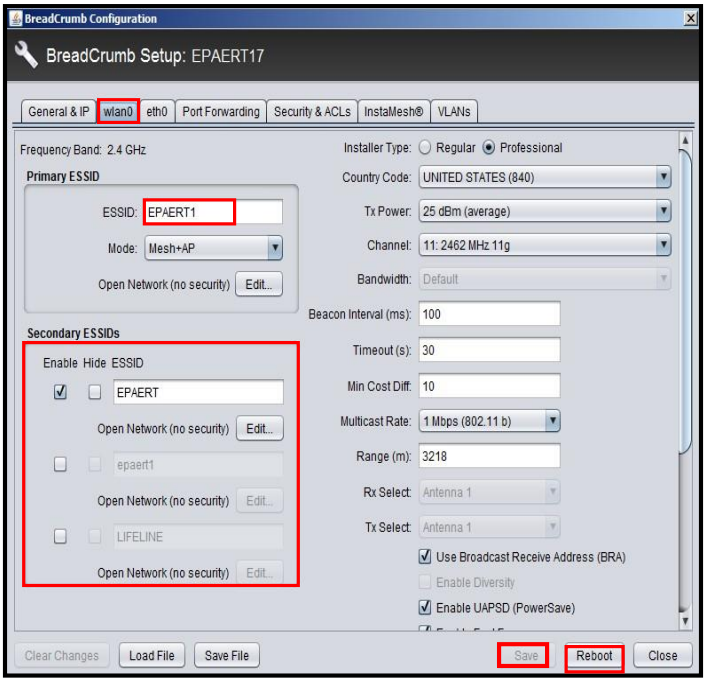
   Contact ertsupport@epa.gov to obtain the password

4. Close any version warning screen.
5. Wait for the Gateway to appear on the screen, then **right-click on the appropriate Gateway**, then choose **configure**.



If the gateway does not appear, see below.

Note: The WiFi portion of a Gateway is configured using either Versions 10 or Versions 11 of Rajant BC Commander. There is no direct way to tell which version will work with which Gateway. If the Gateway does not appear on the screen, the version of BC Commander will need to be uninstalled and the other version installed.



6. Select the **wlan0** tab (DO NOT change any settings on the General and IP Tab).
7. **Change the Primary ESSID** to the new WiFi network name
8. **Click Save**
9. **Click** Reboot
10. **Label the outside of the Gateway with the new ESSID**

The laptop should now be able to connect to the new Wi-Fi network. Also, any LINCs configured to work with new WiFi network can be powered on and the WiFi light should be solid – indicating that they are able to connect to the new WiFi network.

NOTE: There is a Secondary ESSID box located on the wlan0 configuration screen. If you are not sure that all of the LINCs that will be connecting to the new Gateway name have already been changed to look for the new WiFi network, you can enable the secondary ESSID and enter EPAERT1 as a secondary network. This will cause the WiFi to broadcast two different WiFi network names. Therefore, any LINC that might still be configured to look for EPAERT1 will still be accessible from the laptop and the SSID of the LINC can be changed to the new name. When all the LINCS have been changed, disable the Secondary ESSID, Save and Reboot the WiFi router.

Section Seven – Part F: Manually Adding the Gateway (BC Commander v10)

The WiFi portion of a Gateway is configured using either Version 10 or Version 11 of Rajant BC Commander. There is no direct way to tell which version will work with which Gateway. If the Gateway does not appear on the screen, you can try to manually add it in BC Commander by following the steps below. *Note: If the Gateway cannot be manually added, the current version of BC Commander will need to be uninstalled and the other version installed.*

To manually add a gateway to BC Commander (v10):

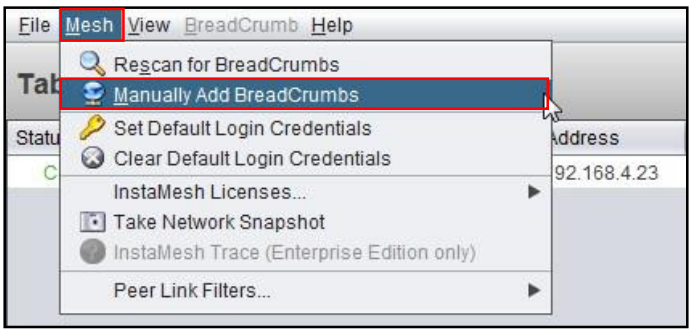
1. Verify your computer is connected to the Gateway's Wi-Fie Network (EPAERT1)
2. Open BC Commander 

3. At the User name and Password prompt, enter the following information

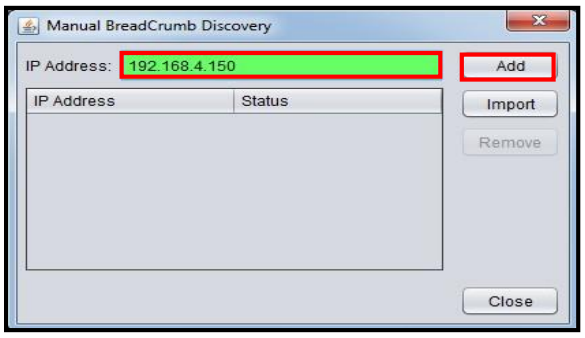
   User: co (Crypto Officer)

   Contact ertsupport@epa.gov to obtain the password

4. Select **Mesh** from the menu bar
5. Select **Manually Add BreadCrumbs** (FYI – a Gateway is a Breadcrumb)



6. Enter the IP Address of the Gateway (i.e., 192.168.4.xxx). .xxx represents the Gateway number.
7. Click Add.



If the Gateway cannot be manually added, please see *Note* above. Please contact

ERTSupport for support in BC Commander v11.

Section Seven – Part G: Cradlepoint Gateway Firewall Rules

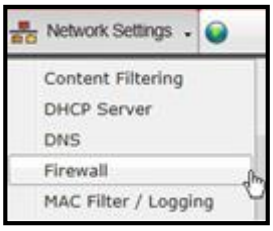
Each LINC sends multiple streams of data to Survey Controller. In order for this information to pass from the WiFi network in the Gateway to the Internet, Firewall rules must be configured for each data stream from each LINC. Older Gateways may have a limited number of LINCs added to the firewall table. If a new LINC is received, it may need to be added to the firewall table.

Gateway Cradlepoint Router firmware 5.4.1 or lower:

- Login to the Gateway Cradlepoint Router:
  - Power On the Gateway
  - With a Laptop connected to the EPAERT1 WiFi Network: Open a browser and enter the Cradlepoint IP address of 192.168.4.1

  or
  - With a Laptop on the internet (not connected to EPAERT1): Open a browser and enter the external address of the Cradlepoint Router HTTP://EPAERTxx.SAFEENV2.COM:8080 (where xx = Gateway number)

- Contact ertsupport@epa.gov to obtain the password



- Navigate to **Network Settings** – **Firewall**

- Scroll the List and determine if the LINC has been properly entered. The image below displays properly configured firewall rules for LINC # 10 and LINC # 11.

Name	Internet Port(s)	Forwarding to	Protocol	Enabled
10d	9010	192.168.3.10:8023	TCP & UDP	Yes
10t	10010	192.168.3.10:23	TCP & UDP	Yes
10g	11010	192.168.3.10:8024	TCP & UDP	Yes
11d	9011	192.168.3.11:8023	TCP & UDP	Yes
11t	10011	192.168.3.11:23	TCP & UDP	Yes
11g	11011	192.168.3.11:8024	TCP & UDP	Yes

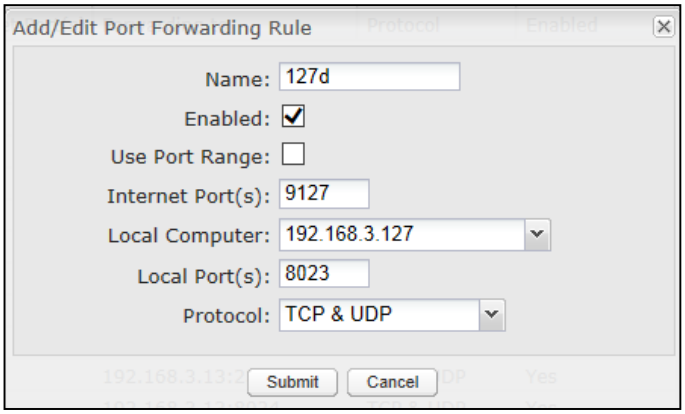
Each LINC # should have three (3) entries in the firewall list where xxx is the LINC # and the ports correspond to the type of traffic (data, telnet, or gps):

- xxxD = data ; port 9xxx ; local comm port = 8023
- xxxT = telnet ; port 10xxx ; local comm port = 23
- xxxG = gps ; port 11xxx ; local comm port = 8024

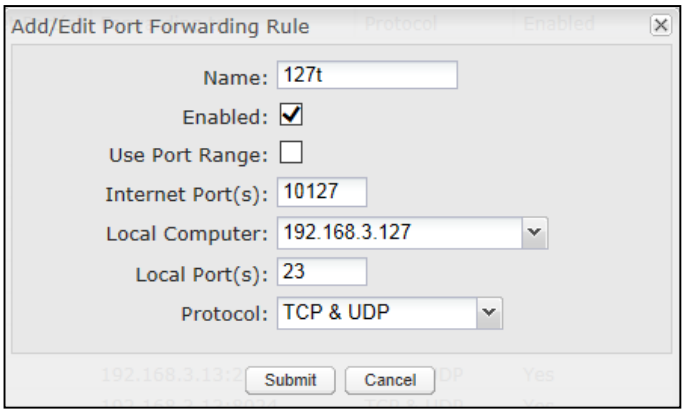
- Click **Add** if a LINC needs to be added to the firewall table

The example below depicts adding LINC# **127** to the firewall rule table

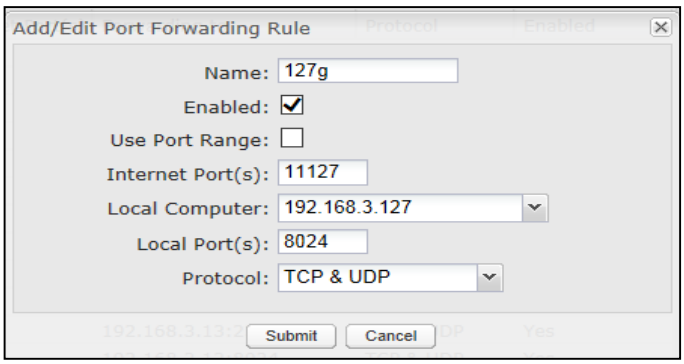
- **Add** the **Data** rule
  - **Name** = LINC# and d (**127**d)
  - Enabled = checked
  - **Internet Port** = 9 and LINC # (9**127**)
  - **Local Computer** = the IP Address of the LINC (192.168.3.**127**)
  - **Local Ports** = 8023 (8023 is always used for Data)
  - **Protocol** = TPC & UPD
  - **Submit** when completed



- **Add** the **Telnet** rule
  - **Name** = LINC# and t
  - **Enabled** = checked
  - **Internet Port** = 10 and LINC #
  - **Local Computer** = LINC IP Address
  - **Local Port** = 23 (always 23 for Telnet)
  - **Protocol** = TCP & UDP
  - **Submit** when completed



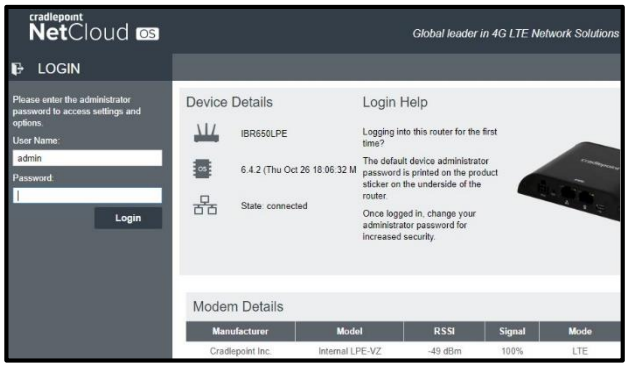
- **Add** the **GPS** rule
  - **Name** = LINC# and g
  - **Enabled** = checked
  - **Internet Port** = 11 and LINC #
  - **Local Computer** = LINC IP Address
  - **Local Port** = 8024 (always 8024 for GPS)
  - **Protocol** = TCP & UDP
  - **Submit** when completed



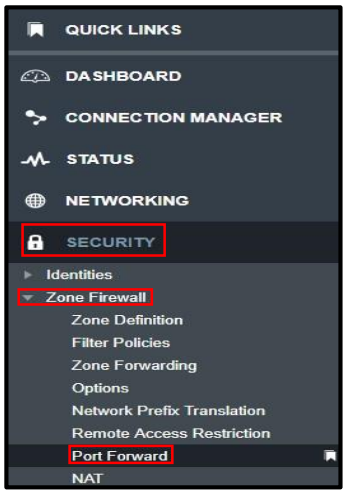
Note: LINC #s are always considered 3 digits when adding rules. If a 2-digit LINC needs to be added (for example, LINC #23), include a leading 0 for the LINC# in the **Internet Port** field for each rule. Internet Port for Data would be 9**0**23, Telnet 10**0**23 and GPS 11**0**23.

Gateway Cradlepoint Router Firmware v6.1:

Login to the Gateway Cradlepoint Router
Contact ertsupport@epa.gov to obtain the password



- Navigate to SECURITY | Zone Firewall | Port Forward



- Scroll the List and determine if the LINC has been properly entered. The image below displays properly configured firewall rules for LINC #225.

Name	Internet P...	Forwarding to	Protocol	En...
225d	9225	192.168.3.225:8023	TCP & UDP	true
225t	10225	192.168.3.225:23	TCP & UDP	true
225g	11225	192.168.3.225:8024	TCP & UDP	true

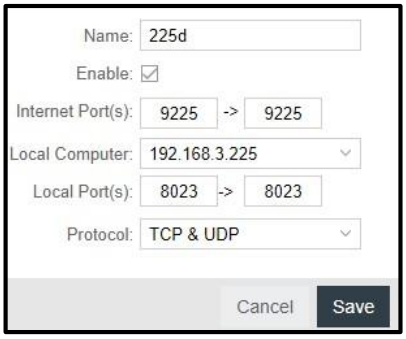
Each LINC # should have three (3) entries in the firewall list where xxx is the LINC # and the ports correspond to the type of traffic (data, telnet, or gps):

- xxxD = data ; port 9xxx ; local comm port = 8023
- xxxT = telnet ; port 10xxx ; local comm port = 23
- xxxG = gps ; port 11xxx ; local comm port = 8024
-

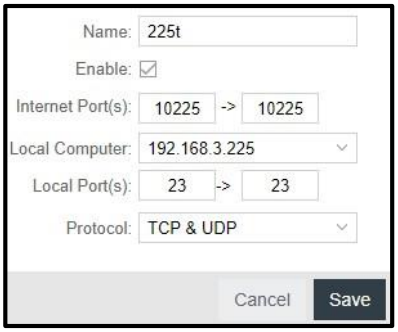
Click **Add** if a LINC needs to be added to the firewall table

The example below depicts adding LINC# **225** to the firewall rule table

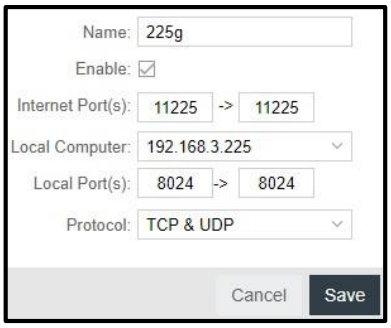
- **Add** the **Data** rule
  - **Name** = LINC# and **d** (**225**d)
  - Enabled = checked
  - **Internet Port** = 9 and LINC # (9**225**)
  - **Local Computer** = the IP Address of the LINC (192.168.3.**225**)
  - **Local Ports** = 8023 (8023 is always used for Data)
  - **Protocol** = TPC & UPD
  - **Save** when completed



- **Add** the **Telne**t rule
  - **Name** = LINC# and **t**
  - **Enabled** = checked
  - **Internet Port** = 10 and LINC #
  - **Local Computer** = LINC IP Address
  - **Local Port** = 23(always 23 for Telnet)
  - **Protocol** = TCP & UDP
  - **Save** when completed



- **Add** the **GPS** rule
  - **Name** = LINC# and g
  - **Enabled** = checked
  - **Internet Port** = 11 and LINC #
  - **Local Computer** = LINC IP Address
  - **Local Port** = 8024(always 8024 for GPS)
  - **Protocol** = TCP & UDP
  - **Save** when completed



Section Eight – Monitoring Instrument Configuration

Section Eight Objective: Provide user with instrument descriptions and helpful tips for using them with VIPER

Section Eight – Part A: Ludlum 2241

Description:

The Ludlum 2241 is a portable microprocessor-based digital scaler/ratemeter designed for use with scintillation, Geiger-Mueller (GM), and proportional type detectors to measure ionizing radiation. Data is presented on a four-digit LCD. A three position switch selects the desired operating mode for the instrument. The display units are autoranging, enabling the readout to display a broad range of radiation levels. The display also offers lower limit capability.

Helpful tips:

- **A stock Ludlum 2241 (2241-2 or 2241-3) needs a factory upgrade to operate effectively with the Viper components.**
    - **To determine if a Ludlum 2241 has been upgraded:**
        - Check the Firmware Version
            - Firmware P-09 will show in the main display of an upgraded Ludlum
            - A small 16 will show in the lower right side of the display
        - Check the gender of the external port
            - Upgraded Ludlum will have a Male external port
    - **Rotary switch must be in the D (dump) position to properly work with the Viper components**
    - **Baud Rate should be set to 9600**

Below is a discussion of enhancements made during the factory upgrade.

- The Ludlum 2241 places 8 Volts on the RI (pin 1) of the DB9 and ties it to CTS as a necessary handshake to get the instrument to start sending data. Also needed are pins 2, 3 and 5 for Tx, Rx and Gnd. All 9 pins are not needed but 5 are required.
- A stock 2241 will not send data unless it is in the DUP (dump) mode (position D of the rotary switch). If the switch is rotated to the "D" position the screen will flash back and forth between DUP and the readings. One of the modifications addresses this issue.
- A stock 2241 also does not provide any data on what position the top rotary switch is in which correlates to the probe. Our modification adds an additional bit to the data message telling us which position the switch is in so that we can show this in the meter application.

Section Eight – Part A: Ludlum 2241 - Continued

- If you place a stock 2241 in the "D" position you lose the "tick" sounds. There was no way to address keeping the sounds without a new controller board design. The modification replaces the controller board and addresses this issue and also houses a micro processor that addresses the first 2 modifications.
- An updated Ludlum can be determined a turn on by checking the firmware version that is displayed. Updated firmware will read P-09 in the main display with a small 16 in the lower right.
- A proper upgrade involves replacing the controller board which means the instrument must be calibrated. The cost for this upgrade is $523.00.
- In order to work with a LINC the full 8 wire ribbon cable must be installed, and the external port gender changed.
- Once upgraded, the 2241 will no longer work with RAT/FAST

Section Eight – Part B: DataRAM

Description:

The DataRAM is designed to measure the concentration of airborne particulate matter (liquid or solid), as well as mean particle size, air temperature and humidity, providing direct and continuous readout as well as electronic recording of the information. It is a high-sensitivity, two-wavelength nephelometric monitor whose light scattering sensing configuration has been optimized for the measurement of the fine particle fraction of airborne dust, smoke, fumes, and mists in ambient, atmospheric, industrial, research, and indoor environments. It is a compact, rugged, and totally self-contained instrument designed for portable, as well as unattended fixed-point operation. It is powered by its internal rechargeable battery, or by an AC power supply/charger.

Helpful tips:

- **DataRAM Device # must be set to 1**
- LINC must be configured for proper baud rate
- Older units (v104 or lower) communicate at 9600
- Newer DataRAM DR4000's (v106) communicate at 38400 (firmware 2008 and later)

Setting the DataRAM 4 Device # to 1

- Power the unit on to display the Main Menu. The Device # will be displayed on the first screen. If not Device #1 proceeded to next step
- Press Next to display the Edit Menu
- Press ▲ ▼ to move to Setup Parameters and press Enter
- Press Next
- Press Next
- Press ▲ ▼ ◀ ▶ to move to Device #
- Press +/- to change the value to 1
- Press Enter
- Press Exit to return to main Menu

Helpful Website:
Environmental Response Technical Group: www.epaosc.org/ertg

- Documents Section contains Quick Start Guides (QSG) and Equipment Operation Guides (EOG) for standard EPA equipment
  - QSG - Hazmat/AirMon - QSG DataRAM 4 v2.0.pdf
  - EOG - EOG CAT2 DataRAM 4.v2.pdf

Section Eight – Part C: AreaRAE

Description:

The AreaRAE gas monitor is a one to five sensor gas detector equipped with a wireless RF (radio frequency) modem which allows the unit to communicate and transmit readings and other information on a real time basis with a remotely located base controller. In standalone operation, the AreaRAE is a rugged, weather resistant, portable monitor that can run over 18 hours on rechargeable lithium ion batteries. It is also the first "lunch box" type multi sensor instrument able to include a photo ionization detector (PID) for parts per million measurement of volatile organic compounds (VOCs), as well as LEL, oxygen and up to two electrochemical toxic sensors for measurement of specific toxic substances such a carbon monoxide and hydrogen sulfide.

AreaRAE Instrument Config for VIPER	AreaRAE MeterApp Config for Viper

• Radio off
• Unit ID= 1
  ○ 1 is strongly recommended. However it is possible to configure the instrument and MeterApp to use a different Unit ID.
• GPS on
• Radio must be Off
• All sensors on (see below for additional details)
• LINC serial port baud rate at 19200
	• Meter app set for Unit ID=1 (default)
	• Meter app Meter Settings Tab
	  ○ Select the Sensors in the order they appear on-screen in the AreaRAE (left to right – top to bottom) Refer to Section 5, Part B for additional info.

Helpful tips:

- Recommended **that ALL** Sensors be turned **ON**. If they are not, the MeterApp needs to be configured to properly account for the sensor configuration.
- Recommend setting the **Unit ID# to 1** through the diagnostic menu
- AreaRAE 900 MHz radio must be OFF
  - If the 900MHz radio is ON then no data is delivered to the external port
- GPS must be ON
  - Can use either LINC or AreaRAE GPS (switch in MeterApp)
- LINC Serial Port Baud Rate must be 19200
- MeterApp will have to be configured for proper sensor orientation
- AreaRAE can be used with the QRAE (MultiRAE PLUS) LINC (after a baud rate change)
  - Specific AreaRAE MeterApp must be used
- Recommend **ALL** sensors be physically installed

Checking the Unit ID from the Diagnostics Menu

- With the unit powered off, push the Y+ button and the Mode (power on) at the same time until the AreaRae turns on. At the 5th display, (i.e., after AreaRae Monitor version; Firmware, Firmware, Instrument Name) verify that it is in Diagnostic Mode. The meter will go through about 10 seconds of display changing before it settles.

- Hold the N/- and Mode button simultaneously. Press the N/- button three times (Calibrate Monitor, Change Alarm Limits, Change Datalog), until you get to the option to Change Monitor setup? Press Y/+ to enter Monitor Setup. Use the Y/+ and N/- to change the value to 1. Hold the Mode Button, Save Yes and press the Mode button twice.

Section Eight – Part D: ChemRAE

Description:

ChemRAE is the latest in state-of-the-art hand-held Chemical Warfare Agent detection and identification systems. It is designed to detect Chemical Warfare Agents (CWAs) and toxic industrial chemicals (TICs). ChemRAE can be used as a stand-alone portable monitor or integrated into an AreaRAE network by using a RAELink2 modem. The ChemRAE weighs less than 2 lbs and can be powered by a rechargeable lithium-ion battery pack or AA batteries. The display provides the operator with agent class, a bar graph of agent concentration and relative time-based dose.

Helpful tips:

- No equipment specific modifications are necessary
- Communicates at baud rate of 19200 (ChemPro is at 38400)

Section Eight – Part E: EBAM

Description:

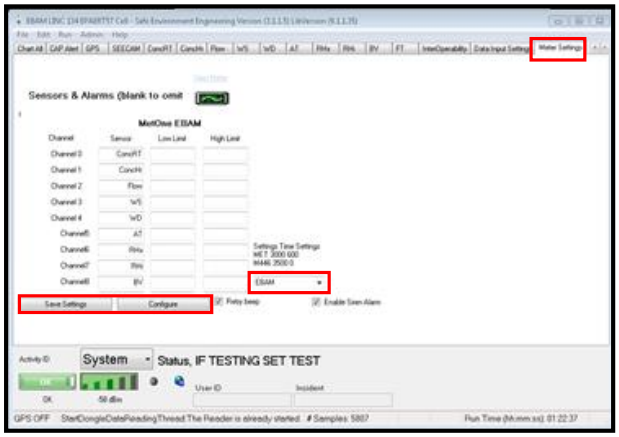
The EBAM is a portable real-time beta gauge traceable to US-EPA requirements for automated PM 2.5 and PM 10 measurement. It provides accurate, precise, real time measurements of fine particulate matter automatically. True ambient sampling provides accurate measurement of semi-volatile nitrates and organic components.

Helpful tips:

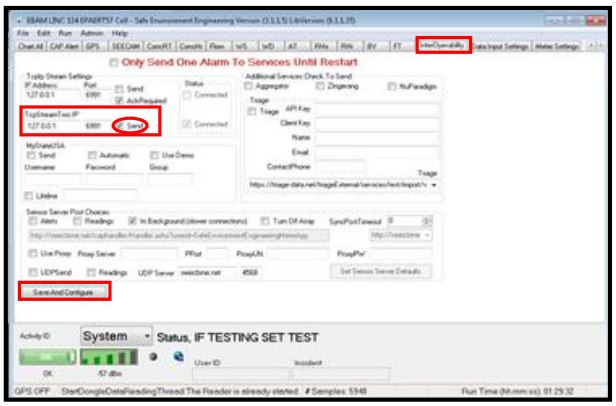
- No equipment specific modifications are necessary
- LINC Baud Rate should be 9600

Troubleshooting:

- If the MeterApp stops pulling data from the EBAM, unlock the MeterApp (See Section Five – Part A)
- Under **the Meter Settings** Tab, reselect the EBam.
- **Save** Settings.
- **Configure**



- On the **InterOperability** Tab, add tcpStreamTwo IP and put a checkmark in the Send box.
- **Save** and **Configure**



Section Eight – Part F: MultiRAE Plus and MultiRAE Pro

MultiRAE Plus

MultiRAE Pro

Description:

The MultiRAE PLUS PID Monitor is a Multi Gas exposure monitor. It gives real time measurements and activates alarm signals whenever the exposure exceeds preset limits. It combines a photoionization detector (PID) with the standard four gases of a confined space monitor (O_2, LEL, and two toxic gas sensors) in one compact monitor with sampling pump.

MultiRAE PLUS Helpful tips:

- **Recommend ALL** sensors be turned **ON**. If not, additional configuration is required
- Communicates at baud rate of 9600
- Unit must be in P2P mode, not wireless mode. This can be set through the P2P Wireless Utility.

MultiRAE Pro Helpful tips:

- **Recommend ALL** sensors be turned **ON**. If not, additional configuration is required
- Communicates at baud rate of 9600
- Unit must be Factory Ordered to be in P2P mode
  - P2P mode can be determined by looking for a symbol in the upper left corner of the display. 
  - The unit is in wireless mode if you see this symbol: 
- Must use the Travel Charger for RS232 charging adapter (green) to connect the LINC. The connection port is in the charging adapter
- Must use the latest generation LINC with USB Cable
- If the sensors are reporting incorrectly in the MeterApp, unlock the MeterApp, click on Meter Settings, and hold down the Ctrl Key (on your keyboard) and click the Configure button in the MeterApp

MultiRae

Travel Charger for RS232

Section Eight – Part G: Single Point Monitor

Description:

The Single Point Monitor (SPM)is a colorimetric instrument that employs a specially created paper tape reel called a “Chemcassette” and an electronic key known as a “ChemKey”. The Chemcassette is a tape medium onto which a known quantity of ambient air containing a suspected contaminant is passed through to create a measurable colored reaction product. The ChemKey stores set-up information and other functional information (i.e. compound[s] of concern, flow rate, alarm levels and compound concentration times) needed for accurate detection of target gases.

Helpful tips:

- The SPM LINC can be run on a standard LINC battery or attached to an external 12V power source through the 12V + and 12V - screws. (Do NOT use both a battery and 12V power source at the same time)
- The 4-20 mA connects from the Amphenol connection on the SPM to the D + and D- screws.
- Set the meter app to the appropriate sensor (key) via the Meter Settings Tab
- Check that the SPs contain the 4-20mA output feature
- If there is doubt that the LINC is working, take off the cover and listen. A properly functioning SPM link will make a noticeable hum.
- If the meter app is collecting data in large negative numbers (i.e., -9,6503), that means there is a hardware problem. To verify, unlock the Meter App, switch to the Log tab and if the MA Line reads 0.00, there is a problem. It should read between 4 and 20. Check the LINC cable is connected to the D+ and D- Line. Check that the cable is not loose on the blue “hocky puck” under the internal LINC (Inside the SPM LINC case). Also check that the SPM internal connections are good and have not vibrated loose. Refer to page 5-8 of the SPM manual for direction on what to check.

Section Eight – Part H: SAM 940

Description:

The SAM 940 Radioactive Isotope Identification Device Surveillance and Measurement (SAM)

- Completely portable isotope identification system in one hand
- Indentification of multiple radionuclides concurrently within one second
- Special Nuclear Material (SNM) detection, enhanced with integrated neutron detection option
- Spectra and user settings transfer easily to PC through CompactFlash card, Ethernet, or USB adapter
- Operates for over 6 hours on standard AA batteries

Helpful tips:

- Serial Mode/Speed on the instrument needs to be set to STRM 115k in order to work properly with the Viper configuration.
    - Power on the SAM940 and enter Administration – not User mode
    - Open the last folder on the right. This folder is hidden in User mode
    - Navigate to Serial Mode/Speed
    - Scroll to the right until STRM 115k is selected
    - LINC Baud Rate is 115200

Section Eight – Part I: UltraRAE 3000

Description:

RAE Systems- UltraRAE 3000 Specific Compound Monitor for VOC, Benzene and Butadiene Gas Detection.

An instrument for applications from entry pre-screening during refinery and plant maintenance to hazardous material response, marine spill response and refinery down-stream monitoring.

Helpful tips:

- Data cradle modifications are necessary
- Uses a specific TTL LINC or a 3rd Gen LINC can be configured for TTL (vs RS232)
- LINC Baud Rate 9600
- Instrument in p2p (wired)

Data cradle modification: The red circled area in the photo displays where the connection needs to be cut and the black wires display the 2 required jumper locations. So, the modification is to make the connection cut on the board and add two jumpers [X].

3rd Generation LINC Modification: If a specific TTL LINC is not available (special order from Safe Env), the following Dip Switch Modifications can be made to a 3rd Gen LINC. The red highlighted area in the photo indicates where the dip switches are located inside the LINC. Configure the Dip Switch settings as follows:

Off – 3,4,5,6,7,8,9,10

On – 1,2,11,12

Section Eight – Part J: LINC

Description:

The Lifeline Interoperable Network Communicator (LINC) is a simple wireless Wi-Fi compliant tool that enables remote live viewing of the information gathered from many existing and different meters (instruments) and sensors. The LINC interfaces with radiological, chemical, physiological, and other meter/sensor categories. A LINC is attached to the meter/sensor. The information is then wirelessly relayed to a Lifeline meter application located in a safe location away from a potential hazard. The LINC is a small rugged sealed enclosure with an integrated GPS capable of transmitting meter/sensor readings and its location once per second for at least 12 hours using an interchangeable rechargeable battery.

Helpful tips:

- Configurable with web interface.
    - Join LINC to Gateway Wi-Fi network (EPAERT1)
    - Join computer to Gateway local Wi-Fi network (EPAERT1)
    - Launch browser
    - 192.168.3.x (last # of LINC IP)
    - Make config changes and Commit
    - Restart LINC

- Most common config modification is changing the SSID
- Second is updating firmware
- Second generation of the original Dongle
- Contains embedded GPS
- Thumbscrews to remove case cover instead of screws. No tools req'd
- Ports in meter app are different than Dongle. GPS data on port 110xx
- Status lights for Wi-Fi, low battery, GPS, and data
- Data and GPS lights will not illuminate unless GPS is happy
- Powered by rechargeable LiON battery pack. 12 hour service life. 12 hour charge cycle
- Hard reset LINC:
    - Power off
    - Depress microswitch for 30 seconds and then turn on while still depressing the switch.

Section Eight – Part K: DustTrak DRX 8533

A more comprehensive guide can be found on the Viper website. To access this guide, click on the link below (or copy and paste the link into a browser). Please be sure you are logged in. If you do not have access to this document, please contact ERT Support at 800-999-6990 or ERTSupport@epa.gov.

https://response.epa.gov/sites/5033/files/Viper%20Guide%20for%20DustTrak%20DRX8533.pdf

Description:

The DustTrak™ DRX Aerosol Monitor 8533 can simultaneously measure both mass and size fraction. The DustTrak DRX desktop monitor is a battery operated, data-logging, light-scattering laser photometers that gives you real-time aerosol mass readings. It uses a sheath air system that isolates the aerosol in the optics chamber to keep the optics clean for improved reliability and low maintenance.

Key Features:

- Simultaneously measure size-segregated mass fraction concentrations corresponding to PM_1, $PM_{2.5}$, Respirable, PM_{10} and Total PM size fractions
- STEL alarm setpoint
- Automatic zeroing (with optional zero module) minimizes the effect of zero drift
- Perform in-line gravimetric analysis for custom reference calibrations
- Manual and programmable data logging functions
- Aerosol concentration range 0.001 to 150 mg/m^3
- Environmentally protected and tamper-proof with Environmental Enclosure
- Cloud Data Management System for efficient remote monitoring
- Heated Inlet Sample Conditioner to reduce humidity effects
- Desktop unit

Helpful tips:

- LINC must be configured for baud rate of 9600
- Please refer to the User Manual for the DustTrakk DRX8533 which can be downloaded from the response.epa.gov/viper website located under the Documents Section.
- DustTraks must be in ‘Survey’ Run Mode.
- Plugging in a Linc to a DustTrak that has been started and running, might result in no data being transferred from the DustTrak to the Linc. If this is the case, it is best to plug in the Linc to the DustTrak prior to the DustTrak being turned on.

Section Eight – Part K: DustTrak DRX 8534

A more comprehensive guide can be found on the Viper website. To access this guide, click on the link below (or copy and paste the link into a browser). Please be sure you are logged in. If you do not have access to this document, please contact ERT Support at 800-999-6990 or ERTSupport@epa.gov.

https://response.epa.gov/sites/5033/files/Viper%20Guide%20for%20DustTrak%20DRX8533.pdf

Description:

The DustTrak DRX handheld monitor is a multi-channel, battery-operated, data-logging, light-scattering laser photometer that gives you real-time aerosol mass readings. It uses a sheath air system that isolates the aerosol in the optics chamber to keep the optics clean for improved reliability and low maintenance.

Key Features:

- Simultaneously measure size-segregated mass fraction concentrations corresponding to PM1, PM2.5, respirable, PM10 and PM Total size fractions
- Lightweight and portable
- Manual and programmable data logging functions
- Single point data logging capability
- Handheld unit
- Aerosol concentration range 0.001 to 150 mg/m^3

Helpful tips:

- LINC must be configured for baud rate of 9600
- Please refer to the User Manual for the DustTrakk DRX8533/8534 which can be downloaded from the response.epa.gov/viper website located under the Documents Section.
- DustTraks must be in ‘Survey’ Run Mode.

Section Eight – Part L: Legacy Gateway

Note: Refer to the User Manual for VIPER – SMART GATEWAY and any TECHNICAL BULLETINS for information on configuring/setting up the Smart Gateway. These documents are available on the response.epa.gov/viper website.

Description:

The Lifeline Gateway bridges the data acquired from a LINC to MeterApp software running on a computer. A standard Gateway contains a WiFi Router and an Internet Router. The Internet Router has Air Card ports for internet communication via the cellular network. The Lifeline Gateway operates on fully charged batteries for at least 8 hours. It is also a local "Hot Spot" for wireless Wi-Fi equipped computers to gain access to the internet when air cards are installed.

Helpful tips:

- Power supply chargers are NOT interchangeable
- Two solid green lights indicate proper operation

Cradlepoint Aircard Internet Router	***EPAERT1 Local Wi-Fi Router***
Cradlepoint Aircard Router Configuration May Be Necessary When: • Firmware Updates are Available • To Determine Air Card Signal Strength • To Add New LINCS to the Firewall Rule Table **Login Locally** with a Laptop connected to EPAERT1: • Power On the Gateway • Verify that the Laptop is connected to the EPAERT1 Wi-Fi network • Open a browser on the Laptop • Enter 192.168.4.1 In the address bar • Username: Admin • Contact ertsupport@epa.gov to obtain the password **Login Via the Internet** • Power on the Gateway (Aircards Installed) • Verify that the Laptop has an internet connection other than EPAERT1 • Open a browser on the Laptop • Enter the Gateway Name plus .safeenv2.com:8080. For example: EPAERT42.safeenv2.com:8080 • Contact ertsupport@epa.gov to obtain the password	The EPAERT1 WiFi router is configured by using the Rajant BC Commander software. See Section Seven – Part D. User: co (Crypto Officer) P/W: breadcrumb-co

Section Eight – Part M: SPM Flex

A more comprehensive guide on the setup of the SPM Flex can be found on the Viper website. To access this guide, click on the link below (or copy and paste the link into a browser). Please be sure you are logged in. If you do not have access to this document, please contact ERT Support at 800-999-6990 or ERTSupport@epa.gov.

https://response.epa.gov/sites/5033/files/Viper%20Guide%20for%20SPM%20Flex%20Setup.pdf

Description:

The Honeywell SPM Flex gas detector is an extractive gas monitoring system that draws gas samples locally or from a remote point to a Chemcassette tape-based optical gas detection system. A wide range of toxic gas Chemcassette cartridges are available that enable detection of gases used or generated in semiconductor manufacturing and industrial environments.

Key Features:

- Easy to choose the target gas
- Quick start-up for emergency response
- Visible at a distance with crisp, colorful LED bar on top of unit

Section Nine: Basic Troubleshooting (WiFi Mode)

The steps below outline troubleshooting when Survey Controller is running on a local laptop connected to the EPAERT1 WiFi network:

MeterApp launches to the taskbar and not full-screen

The MeterApp must first launch full screen before continuing with troubleshooting. (See Section Four, Part B for additional information) When the MeterApp launches minimized to the taskbar and not full-screen, this indicates that Survey Controller cannot see the LINC. This indicates a network communication issue.

- Step 1 -- verify the laptop is on the EPAERT1 WiFi network
- Step 2 -- verify that the LINC is powered on
- Step 3 -- verify that the WiFi light is solid on the LINC. No solid light means the LINC is not on the EPAERT1 network.
- Step 4 -- Check the distance between the LINC and the Gateway
- Step 5 -- Check the antenna pin on the LINC
- Step 6 -- Check the connection to the WiFi chip inside the LINC
- Step 7 -- If the steps above are good, this situation requires advanced troubleshooting of the LINC.

MeterApp launches full-screen but does not turn green (no instrument data)

If a MeterApp launches full-screen but does not turn green/the number of samples in the MeterApp does not increase, there is a communication problem between the instrument and the LINC

- Step 1 - Is the instrument powered on
- Step 2 - Is the data light solid on the LINC
- Step 3 - Is the LINC cable securely connected to the LINC and to the Instrument
- Step 4 - Are the required instrument-specific settings configured on the instrument? Refer to Section 8 for instrument specific requirements. Below are examples of common instrument settings required for proper operation with Viper:
    - DataRam – Unit ID = 1
    - AreaRAE – Radio must be OFF
    - MultiRAE Plus - Unit must be in P2P mode
- Step 5 - Is the LINC configured for the required instrument-specific communication rate (Baud Rate)?

- Logging in to the LINC is required to check this setting. Make sure the Laptop is connected to the EPAERT1 WiFi network
    - Open a browser window (Internet Explorer/Chrome, etc) and type the IP Address of the LINC:
        - The LINC IP Address should be 192.168.3.xxx – where xxx represents the LINC number
        - At the login prompt:
            - Username = dpac
            - Contact ertsupport@epa.gov to obtain the password
        - Navigate to the "Configuration" menu
        - Select "Serial Port Settings"

MeterApp launches and turns green but Survey Controller LINC light stays Red

Once a MeterApp launches and turns green, the data should be received in Survey Controller – indicated by a green light for each LINC. See Section Four, Part B for more details on Survey Controller LINC lights.

Red Survey Controller LINC Light can indicate two different situations

- Red Light with "No GPS Received" indicates that coordinate data has not yet been received for this LINC. Data will not be collected and sent until at least one GPS reading has been received.
    - To temporarily bypass the LINC GPS, right-click on the LINC and enter fixed coordinates in order to begin capturing data. If coordinates are unknown, entering 0,0 for latitude and longitude will be sufficient to begin recording data. However, those records will not be tied to a valid location. As such, entering 0,0 should only be used as a last resort until valid coordinates are available
- Red Light with "No Data" indicates that Survey Controller is not communicating with the LINC/MeterAPP.
    - Verify that the MeterApp is functioning properly as discussed above.
    - Verify that the Laptop is connected to EPAERT1
    - Verify that the LINC/Gateway is configured to communicate in WiFi Mode

Section Ten: Basic Troubleshooting (Cellular Mode)

Using Survey Controller on a computer that is NOT connected to the EPAERT1 WiFi network is the most common way to use Viper because it allows Survey Controller to be run remotely from the instruments/gateways.

MeterApp launches to the taskbar and not full-screen (cellular mode)

When configuring a Cellular run, properly configured internet access for the laptop, (Survey Controller) and the Gateway are critical.

- Step 1 – Check Survey Controller Equipment Inventory
  - In Survey Controller, Open Lifeline Equipment Inventory and insure the Gateway external address has been properly identified. Refer to Section Two: Part B for additional information

- Step 2 – Check that the Laptop has internet access
  - Open a browser and navigate to any website (www.epaosc.net, Google, etc)

- Step 3 – Check that the Laptop can reach the Gateway Cradlepoint "Aircard" Router via the Internet. There are two routers in the Gateway – one that controls the EPAERT1 WiFi network and one that controls the External Aircard Internet network
  - Open a browser and Log in to the router via the External Address of the Gateway (http://epaertxx.safeenv2.com:8080)
    - If the Gateway Login Screen appears, the Laptop Internet Connection is good.

- Step 4 – Check that the LINC has been added to the Firewall table of the Gateway Cradlepoint Router. The LINC sends three different types of information to Survey Controller. In order for this information to pass from the WiFi network in the Gateway to the Internet, Firewall rules must be configured for each data stream from each LINC. For additional information on how to enter the firewall rules, see **Section Seven – Part G** of this Guide.

  - Login to the Gateway Cradlepoint Router :
    - Wifi – Open a browser and enter this address to 192.168.4.1
    - Cellular – Open a browser and enter this address HTTP://EPAERTxx.SAFEENV2.COM:8080 (where xx = Gateway number)
    - Navigate to Security|Zone Firewall|Port Forward
    - Scroll the List and verify that the LINC is properly added.
      - Properly Configured LINC Rules are as follows:
      - Each LINC # should have three (3) entries in the firewall list where xxx is the LINC # and the ports correspond to the type of traffic (data, telnet, or gps):

- xxxD = data ; port 9xxx ; local comm port = 8023
- xxxT = telnet ; port 10xxx ; local comm port = 23
- xxxG = gps ; port 11xxx ; local comm port = 8024
- i.e. to add a LINC # 202, input the following for each of the 3 rules :
  - Rule Name = 202d

- Port = 9202
- Local Computer = 192.168.3.xxx
- Local Port = 8023 (because you are creating the 'd' for DATA rule)
- Protocol = TCP & UDP

- Step 5 – Check that the Gateway Cradlepoint Router has a Public IP Address.
  - Connect a Laptop to the EPAERT1 Wireless network.
  - Open an internet browser (Explorer/Chrome, etc) and in the address bar type, 192.168.4.1
  - Contact ertsupport@epa.gov to obtain the password
  - Check the IP Address on the Status/Dashboard page – INTERNET section.
    - IP Address *cannot* be in any of the following ranges:
      - 10.0.0.1 to 10.255.255.254
      - 172.16.0.1 to 172.31.255.254
      - 192.168.0.1 to 192.168.255.254
      - 100.64.0.1 to 100.127.254.254

- Step 6 – Check that the LINC has the proper Gateway Address
  - Connect a Laptop to EPAERT1 WiFi and access the LINC via the IP Address of the LINC
    - Open a browser and type 192.168.3.XXX (xxx is the LINC #)
      - Username = dpac
        Contact ertsupport@epa.gov to obtain the password
    - Check that the Default Gateway = 192.168.4.1 (Cradlepoint Gateway Address)

Optimizing Cradlepoint Aircards

- Using an Internet Browser, navigate to the Gateway (xx respresents the Gateway ID) Http://epaertxx.safeenv2.com:8080

    - Before entering a password, the login page displays
        - Manufacturer of the Aircards installed
        - Model of the Aircards installed

        - Signal Strength of the Aircards
            - Decible Display (-95dBM is LESS powerful than -80dBM)
            - (Anything less than -85ish should be fine)
                - (fyi - full range is -120 to -40)
            - Percentage Display (95% is MORE powerful than 80%)

        - Mode of Communication
            - EVDO (3G)
            - 1xEV-DO (3G)
            - WiMAX (Advanced 4G)
            - LTE (4G)
            - 1xRTT (Pre 3G - slow)

Modem Modem Details

Manufacturer	M	Manufacturer	Model	Signal	Mode
Franklin	U	Sierra	250U - 4G	NA	Not Reported
Franklin	U	Sierra	250U - 3G	-85 dBm	1xEV-DO,1X
Pantech,	U	Pantech	UML290VW	-96 dBm	1XRTT

Modem Details

Manufacturer	Model	Signal	Mode
Pantech	UML290VW	-78 dBm	LTE

Modem Details

Manufacturer	Model	Signal	Mode
Sierra	250U - 4G	-74 dBm	WiMAX
Sierra	250U - 3G	-125 dBm	No service
Pantech	UML290VW	-74 dBm	LTE

Franklin = Sprint/ATT Pantech = Verizon Sierra = Sprint/ATT

- Manage the aircards in the Cradlepoint Software
    - Open an internet browser to access Http://epaertxx.safeenv2.com:8080
        - Contact ertsupport@epa.gov to obtain the password
        - Select the “Internet” Tab
        - Select “Connection Manager”
        - Enable, Disable, Change Priority, etc